IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication JUNE 8, 1961

George Kufrin

Martin Tool Works and Others Prove—

Small Business Can Still Make a Go of It p. 59

West German Tool Markets p. 64

Balancing Assembly Workloads p. 89

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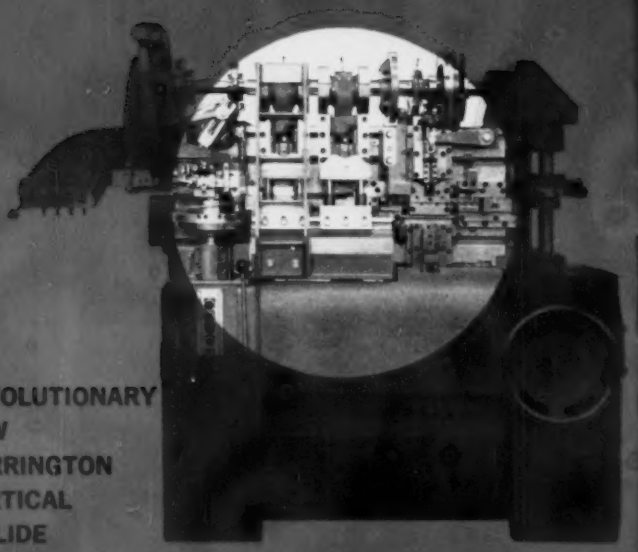

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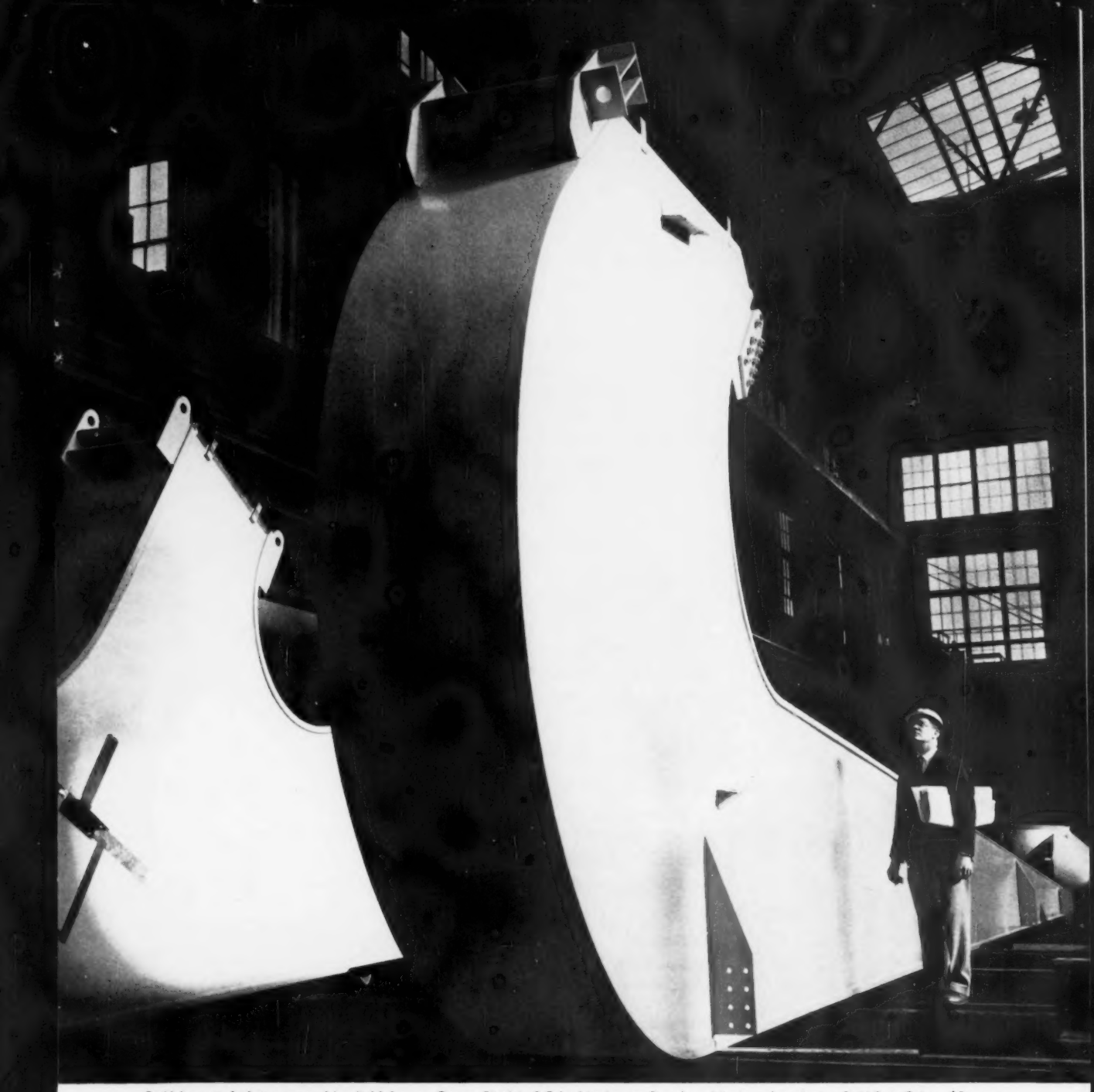

Bethlehem steel plate was used in all 66 frames. Owner: District of Columbia Armory Board; architects and engineers: Dahl-Ewin-Osborn (George L. Dahl, Dallas; Ewin Engineering Associates, Wash., D. C., the Osborn Company, Cleveland; associated for this project); builders: McCloskey & Co.

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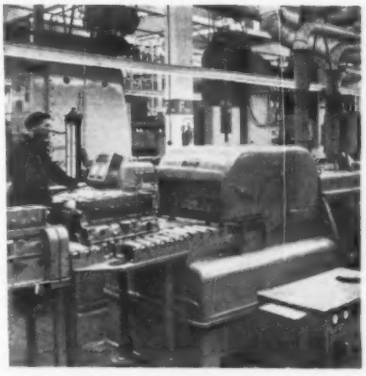
Special This Week

Small Business: Owner Is Key

What does it take for a small company to compete successfully today? The key ingredient is an owner such as E. J. Martin (left) shown looking over a new job with his plant manager R. A. DeRenzo. These men, and others like them, plow money back into the business, and strive for quality. p. 59



Orders Mount for W. German Tools

The order backlogs of West Germany's machine tool industry are one sure sign of the country's continuing industrial expansion. Some tools are quoted for delivery in 20 months or more. Exports run high, have suffered little from the D-Mark revaluation. p. 64

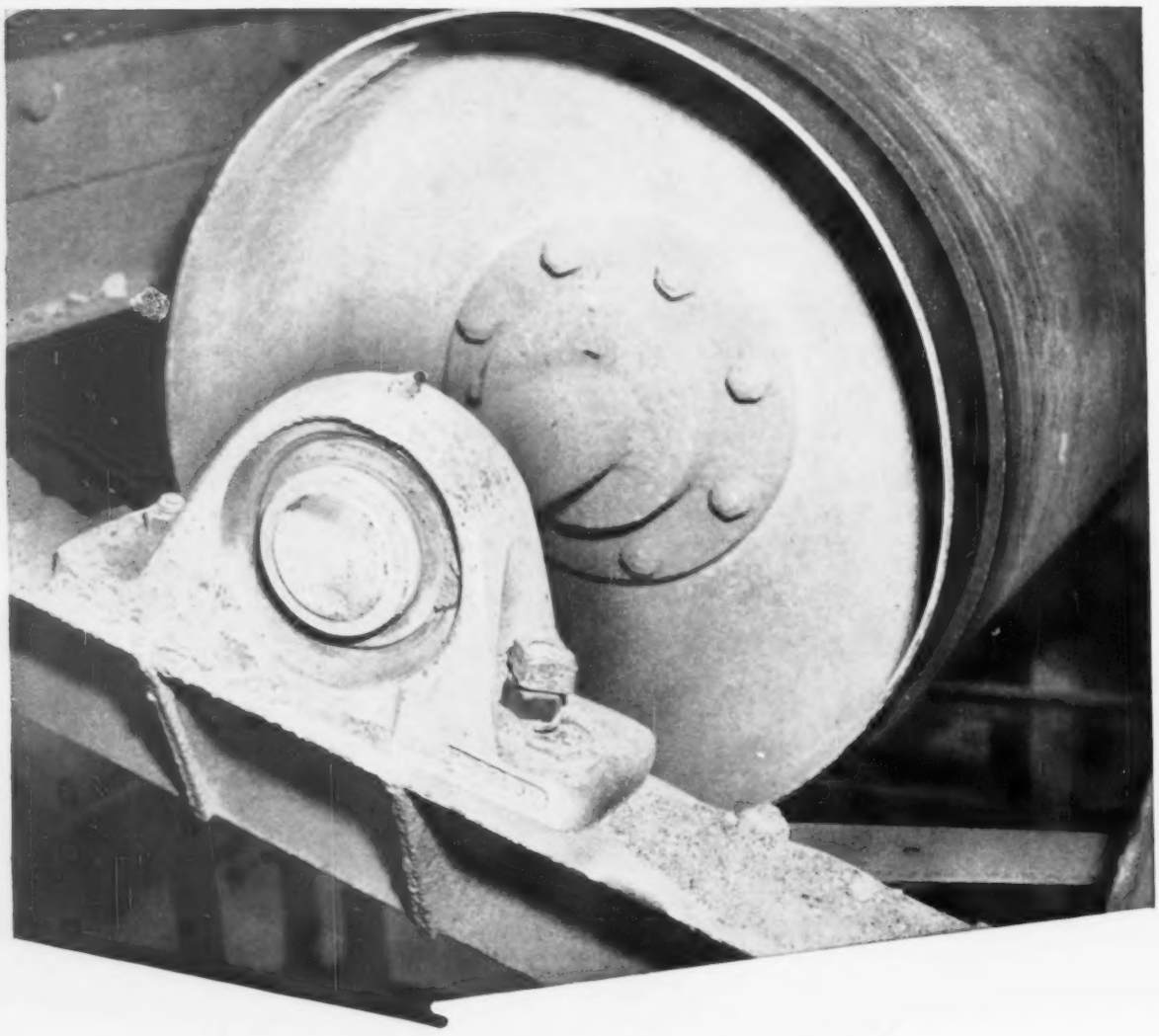
How to Balance Assembly Workloads

Efficient assembly lines operate at 94-95 pct of possible output. But many of today's progressive-assembly lines waste 10-25 pct of the workers' time. Armed with just a pencil and paper, your plant engineer can smooth out an unbalanced line. p. 89

Next Week

Patent Policy Is Under Attack

Congressional patent experts, headed by Sen. John L. McClellan, are deciding who should have patent rights developed under government-financed research contracts. This special report covers pro's and con's of issue and what's likely to happen.



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South American Test: We Are About To Face One

Our government's attempt to help the underprivileged in South America has been approved. The pens have been distributed. The authors are happy. The South American diplomats have had their say.

So far so good. But it will mean absolutely nothing if the Administration bungles this job. The $500 million was announced by the last Administration as a major South American "Marshall Plan." The talk came at a time when Castro was riding high.

Many to the South of us—and Castro in particular—labeled the plan a move to offset Castroism. There were many in this country, too, who were shocked at the time picked to engineer the plan. But it was thought up. And now it has been approved.

This is only the first step in the flow of U.S. money to Latin nations. Before we are through, American taxpayers may dump as much as $2 billion into South American nations. The purpose: To help the poor, to raise the per capita income and generally to raise the standard of living—and health.

So far that sounds like gigantic social service talk. It is true that the law and the spirit assume that Latin governments will revise their fiscal policies, stop blatant inflationary trends and use the money—matched with their own—to produce the best for the most.

That high principle had better be adhered to. More than any other thing at present, officials in Washington had better break the string of "hard luck" they claim they have had. The money to South American projects had better go entirely for the purpose intended.

If there is a repeat of some of the tactics in past foreign aid, or if there are graft and kickbacks, we are in for trouble. And it will be trouble.

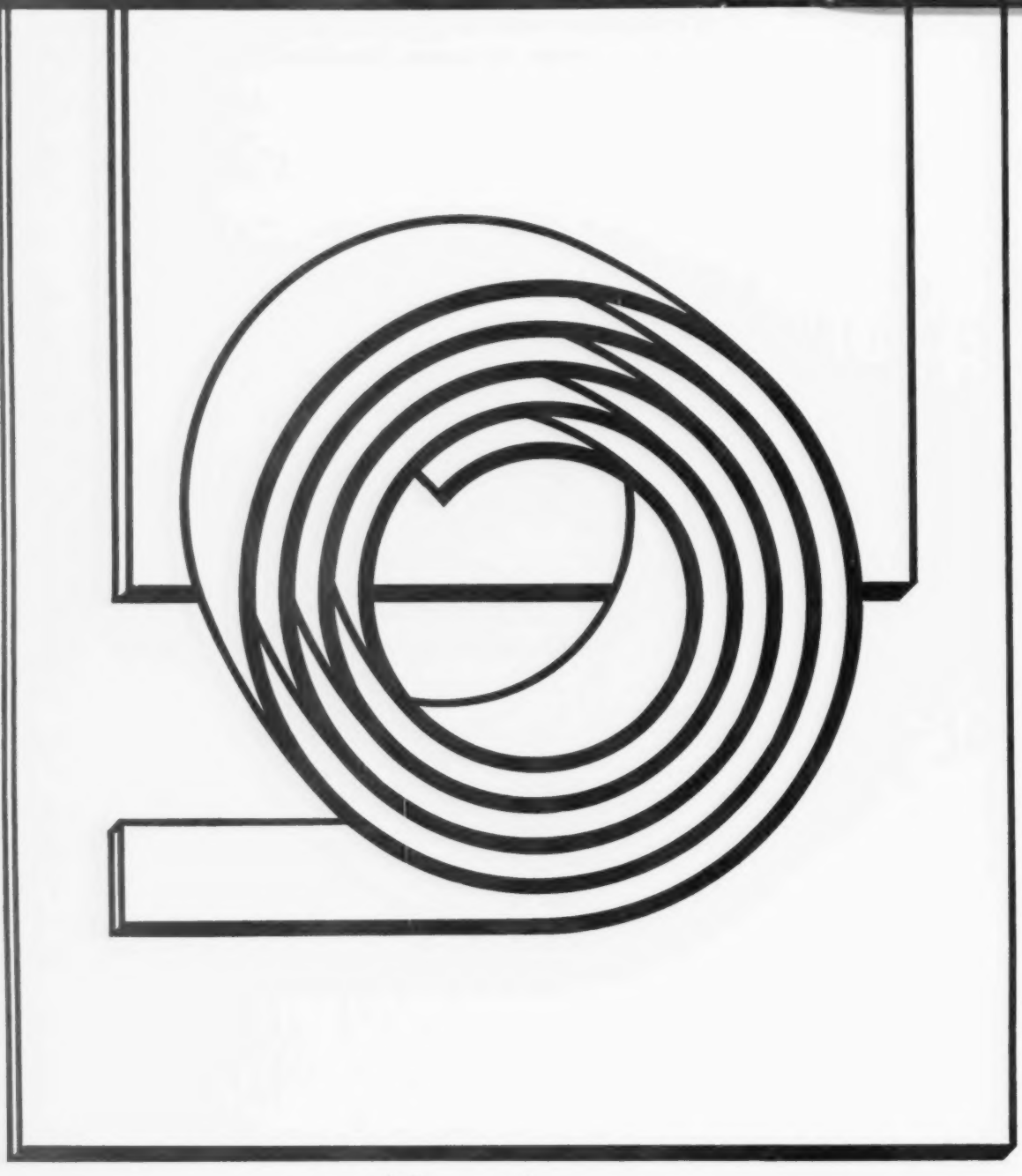
The younger element and the serious and sincere element in South America are watching us like hawks. If it looks as if our new South American "Marshall Plan" may go down the drain as billions of other American dollars have, we will be the laughing stock of all Latins—more so, even, than we are now.

We must insist on a clean, honest and intelligent administration of the Latin plan.

Not to do so—or to fail after trying—will make us dead ducks in our own backyard: Something Castro and others would be delighted to see.

Tom Campbell

Editor-in-Chief



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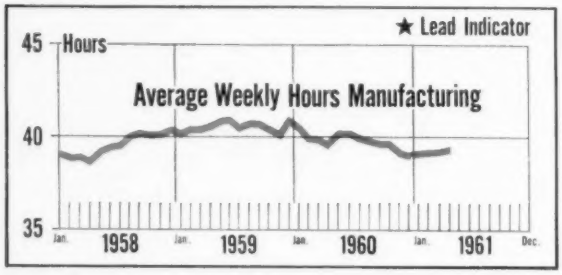
Longer Hours For Workers

The factory workweek rose in April over March from 39.1 to 39.2 hours. Coupled with an improving employment picture and mounting business good news, the workweek gain can be considered one of the best



indicators of coming renewed vigor in consumer buying.

So far, much of the added income from fuller employment and extended workweek has gone into savings and payoff of installments. Deposits in U.S. banks in April increased by over $4 billion over March. And through the first quarter, installment credit has shown a steady decline. Soon, consumer dollars will flow more to products and service buying.

Summer Letdown: A Spoiler?

A big question with the wary is whether the summer letdown will put a damper—or worse—on recovery. This is not likely.

Probably what will happen is this: General activity will be great enough to at least keep ordinary statistics on the level so that no downturn is indicated. This is especially true for appliances, farm implements, oil and gas, and general steel production.

Business Wheels Spin Faster

A whole bushel-full of business good news last week tumbled from the Commerce Dept.'s statistical basket.

1. Durable goods industry sales in April, seasonally adjusted, rose to $14.15 billion from $13.69 billion in March. This is the highest sales level since October.

2. New orders for durable goods in April rose to $14.58 billion, up from $13.82 billion in March. This is the highest mark since last September. And the biggest monthly gain since the recovery period of 1958.

3. The "spread" between new orders and shipments of durables widened favorably during April. New orders exceeded shipments by $430 million. In March the spread was only $130 million.

4. And new orders received by all U.S. manufacturers in April rose to a 16-month high.

Some bumps and lags may develop in the month-to-month pattern of factory sales and orders but the surge seems strong enough to keep a steady upward trend.

Price Relief Faces Challenge

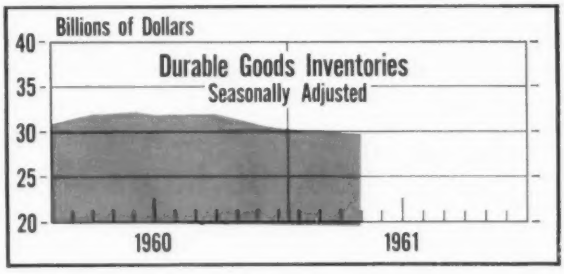
In the coming months, U.S. business will be looking for price relief to ease the profit sqeeze. And not without reason. Net profits, after taxes, for U.S. manufacturing companies dropped by over one-half billion dollars from the second quarter of 1960 to the last quarter of the year.

But price relief will be a hard nut to crack. Maybe harder than ever before. Reasons: New dimensions of competition, sentiments of the Administration, current prices that had inched upward even during the recession, and a lot of people still out of work.

Durable Goods Inventories Down

The strip-down in durable goods industries inventories continues. But it is probably nearing an end. Soft goods stocks have already hit bottom.

Stocks held by durable goods producers dropped from $30.3 billion in March to $30.16 billion in



April. This is the eighth straight month the seasonally adjusted stock level has shown a decline.

A rise in steel producers' inventories during April was more than offset by stock reductions in other industries to result in the $100 million-plus drop.

Defense Spending Is Overrated

Don't look for stepped-up defense spending to be a shot in the arm to further business recovery. This is the view of economist Eliot Janeway.

He sees no truth in the old assumption that "bad news from abroad and big numbers from Washington automatically mean good news for the economy," Mr. Janeway claims that higher net earnings and higher values "do not necessarily result" from increased defense spending, especially emergency spending.

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Kennedy Asks Bill To Retrain Jobless

Congress is considering a Presidential request for Federal funds for retraining of long-term unemployed workers. Both House and Senate hearings were slated to get underway this week.

Hazy estimates put the price for the program at $60 to $100 million for the first year. It could run higher after that as the President wants to cover retraining of several hundred thousand workers over a four-year period.

Federal money would pay the unemployed as they learn new skills. It would also pay up to half of the worker's moving bill if he relocated in a new area where a job could be found.

The President's bill would give jobless workers up to 52 weeks of training for a new skill. Where training is on-the-job, employers' payments could be supplemented by the government. However, weekly compensation would be limited in both cases.

Ace Trouble-Shooter

Don't expect Labor Secretary Arthur J. Goldberg to take sides in either auto negotiations this year or steel contract talks next year.

If need be, he will use pressure in these negotiations. But he will press for what he thinks best for the country—and what he knows the President wants.

This will make him the ace trouble shooter in the months to come. And he won't be shy in telling the unions when he thinks they are off base, as well as the companies.

Commission to Handle Missile Base Disputes

The no-strike, no-lockout pledge from labor and management to the government on missile base construction will throw disputes into the hands of a new 11-member missile sites labor commission.

The commission was established by President Kennedy to prevent or settle disputes at missile bases. It has three representatives from industry, three from unions, and five from the "public."

It will issue directives on any disputes. Both unions and managements agreed to respect the directives. Thus, there will be no work stoppage while disputes are being settled.

IUE: Follows Lead Of UAW in Demands

General Motors Corp. negotiators can expect a familiar ring to the demands when they sit down with the International Union of Electrical Workers this summer.

IUE's program is almost a carbon-copy of the program set by the United Auto Workers.

The electrical union is looking for more jobs and a regular income. It proposes trimming working time through both a shorter workweek and longer vacations.

Employment: Mild Gains

Only a mild improvement is showing up in the employment picture.

Despite an increase in employment in May of 1 million workers, the number of unemployed dropped by only 200,000, according to the latest survey by the Labor Dept.

Only half of the newly employed went into non-agricultural industries. And on a seasonally adjusted basis, the unemployment rate actually climbed a notch to 6.9 pct from April's rate of 6.8 pct.

Another gloomy note: Nearly 2 million workers have been jobless for 15 weeks or longer. This is about 200,000 fewer than April.

Factory hirings exceeded separations in April. This is the first time this has happened since June of 1960. But once again, the figures can be misleading. The switch was due mainly to a reduction in layoffs.

Hirings fell from 33 per 1000 to 31 for the month. But separations fell even more, dropping to 28 per 1000 from 34. The layoff rate dropped to 16 per 1000 from 22 the previous month.

Employment pickups, such as in the auto industry, also helped. Ford Motor Co. says its employment "has been restored virtually to pre-recession levels." The automaker has recalled about 15,000 hourly workers since late March.

Ford's total hourly and salaried on-rolls employment now is in excess of 162,000—about 2000 more than a year ago.

One other mild improvement in the picture: The number of major industrial centers with unemployment rates of 6 pct or more declined. Of 150 major centers, 96 were still classed as having substantial unemployment. This is five fewer than the record 101 in both March and April.

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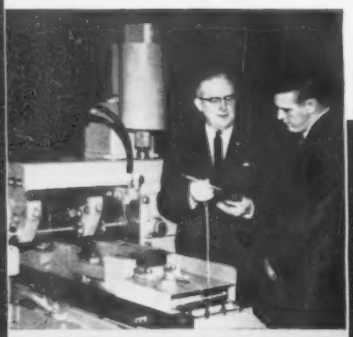
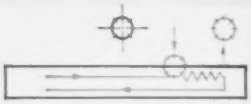
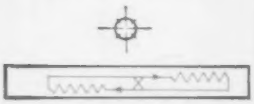


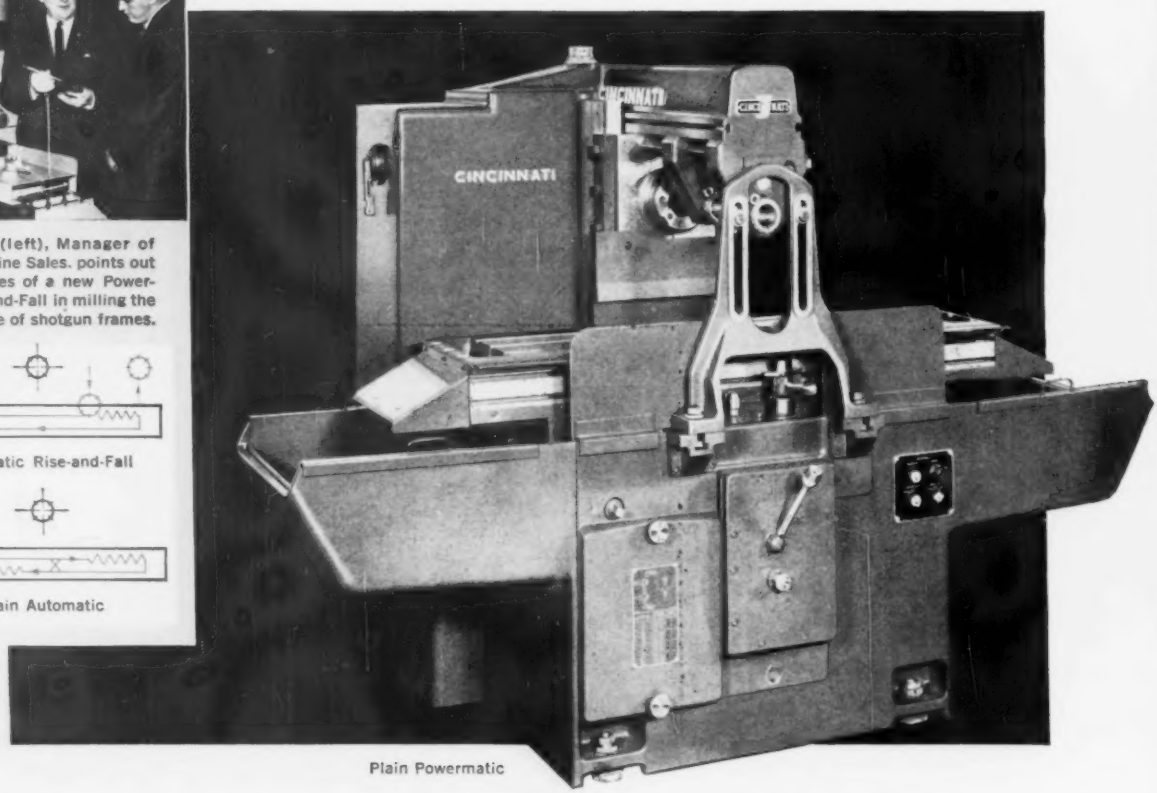
Jack Lynch (left), Manager of Milling Machine Sales, points out the advantages of a new Powermatic Rise-and-Fall in milling the bottom profile of shotgun frames.



Automatic Rise-and-Fall



Plain Automatic



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★Coming: Big Housing Program

A multi-billion-dollar housing program will come out of Washington this year. Housing has become the foundation of the government's plans for long-range economic buildup.

Legislation to pump billions of dollars into the economy through construction funds is getting the "go" sign all over Washington.

President Kennedy has drawn up a huge housing plan. Democrats in Congress are making it larger. And even Republican Congressmen, fearing the broadness of fellow legislators' plan, are backing the President's program.

Both the Administration bill and the Democrat Congressmen's measure, passed by the House Banking Committee, would provide billions in additional Federal funds for housing. These Federal grants or low-interest loans would go for city slum clearance, college dormitory construction, and public housing for an additional 100,000 families.

The price tag on both plans is about $5 billion.

Biggest difference in the plans is the amount for Federal loans for public works in small towns. The Committee-approved bill would provide $500 million instead of $50 million requested by the President for direct loans to small communities for waterworks, libraries, and other local facilities.

But the housing splurge doesn't have to wait for passage of this legislation though it is sure to come. Already, the President has signed into law emergency legislation giving the Federal Housing Administration an extra $1 billion in mortgage insurance authority. It is designed to tide the agency over until Congress enacts the housing bill.

Steps also are being taken to expand the Government's mortgage buying program in an effort to drive down home loan interest rates.

And White House sources say this is by no means all. Other housing programs are expected to come from the President shortly.

■ Antitrust Actions May Hit High in '62

The number of businesses in trouble with the Antitrust Division of the Justice Department will reach an all-time high in 1962. It's estimated that the division will begin 1962 with 176 cases pending and end with 211 pending.

It began in 1961 with only 141 cases pending and 1960 with only 100.

The increasing caseload prompted antitrust officials to request 36 additional staff members for next year. In okaying the funds for a bigger staff, the House Appropriations Committee reported it "expects the Department to do everything possible to accelerate and make more effective the program on enforcing the antitrust laws."

■ Minimum Wage Law Causes Confusion

Confusion in the new minimum wage law will be expensive to business. The Labor Department, which must interpret the law before it goes into effect Sept. 3, is having trouble untangling it.

If the Federal wage-hour law experts are having trouble with the law, business may find it even more troublesome.

Confusion centers around the law's tests for exemption, partial coverage of some workers, and coverage of workers engaged in "interstate or foreign commerce."

And threatening businessmen who make mistakes using the law is the power of the government to punish errors. The government sues for back wages of any worker who is covered and not paid the minimum. The courts usually grant an equal amount in damages to the worker.

■ Congress to Extend Corporate Tax Rates

While the President's special tax package raised a hullabaloo in Washington, Congress quietly began action to extend corporate tax rates for another year.

There is no doubt the wartime tax rate will be extended once again by Congress before it expires at the end of this month.

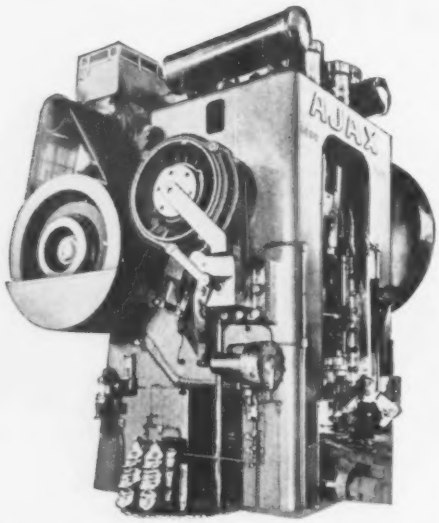
■ Waste in Defense Spending Watched

President Kennedy has promised Congress his full cooperation in helping to clean up wasteful defense spending.

The President made his promise to Rep. F. Edward Hebert, (D., La.), chairman of the House Armed Services Investigation Committee. Rep. Hebert says the President told him he would inform Defense Secretary Robert S. McNamara to cooperate fully with the Committee's new investigations of wasteful Pentagon spending.

Rep. Hebert says of the new probe: "We're going to name names and start heads rolling."

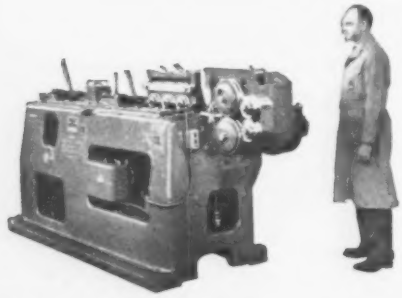
the Ajax line
OF METAL WORKING MACHINES



"HIGH SPEED" FORGING PRESSES

Built in 13 sizes from 300 to 8000 tons capacity. Ajax Presses are built with massive, solid, mill housing-type steel frames. Rigid frames assure excellent alignment and accurate die match for the production of uniform and accurate forged parts.

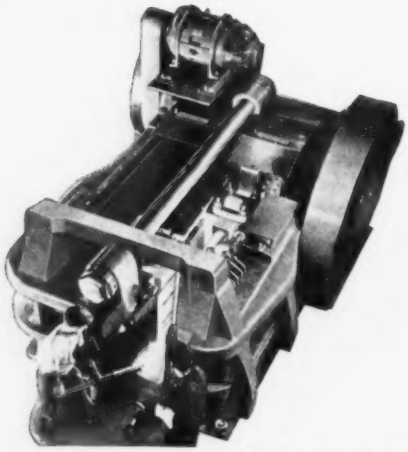
Write for Bulletin 75-C



AJAX-HOGUE WIRE DRAWERS

An attachment for any size cold header and parts former. It cold draws wire in a straight line from hot-rolled stock instead of cold-drawn wire. You save the difference in cost of material and at the same time produce the highest quality cold-headed parts.

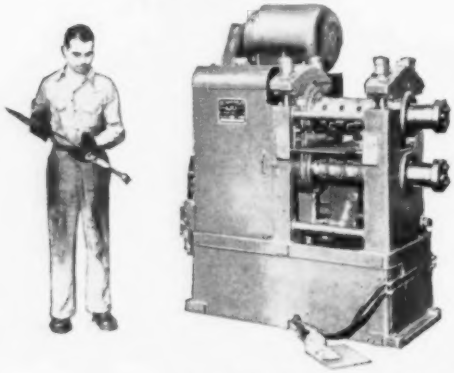
Write for Bulletin 111-B



"AIR CLUTCH" FORGING MACHINES

Choose from a complete line of forging machines—Sizes 1" to 12" to make the forged parts you need . . . Transmission gears —Flanged axle shafts—Crankshaft flanges—Jet Blade Blanks—Implement & Tractor forgings. There's an Ajax Forging Machine for every field of upset forging in industry.

Write for Bulletin 65-D



"WIDE ADJUSTMENT" FORGING ROLLS

Pre-roll your forging blanks for metal saving—longer die life—and better fibre flow. Ajax Rolls are available in 7 sizes to pre-roll forging blanks ranging from connecting rod blanks to the largest propellers. Extension shafts with overhanging dies permit rolling long work.

Write for Bulletin 91-B

SERVING THE FORGING INDUSTRY SINCE 1875

THE Ajax MANUFACTURING COMPANY
1441 CHARDON RD. CLEVELAND 17, OHIO
CHICAGO OFFICE: 110 S. DEARBORN STREET CHICAGO 3, ILLINOIS
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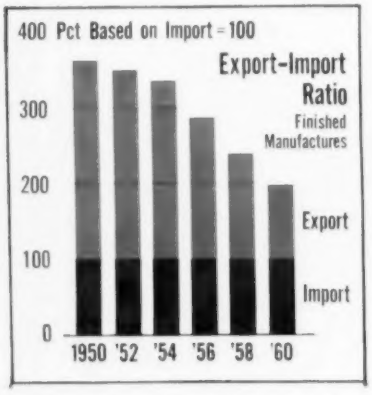
Burns, Hodges Issue Trade Warnings

Arthur F. Burns, president, National Bureau of Economic Research, has warned that "although the United States remains the primary exporter of manufactured goods, our leadership in world markets is nowadays being challenged steadily, widely, and often successfully."

Dr. Burns made his remarks at the 69th General Meeting of the American Iron and Steel Institute in New York recently.

He said: "We must conduct our domestic economic affairs so that our level of costs and prices stops rising. More specifically, we need to conduct our affairs so that the excess of our exports over imports will be large enough to enable us to discharge effectively the international responsibilities which have been forced upon us."

Dr. Burns pointed out that the ratio between exports and imports



of finished merchandise has closed drastically since 1950 (see chart).

Along these same lines, Commerce Secretary Luther Hodges told the New York World Trade Committee recently that "our industrial competitors are surpassing us in drive, vitality, and are gaining an ever stronger trade position relative to the United States."

Said Mr. Hodges: "We realize that the U. S. today is completely unable to go it alone economically."

Kennedy Proposes New Foreign Aid Agency

Foreign aid will be administered by a single agency within the State Dept. under a new plan of President Kennedy. It would be called the Agency for International Development (AID).

The new agency, to replace the International Cooperation Administration (ICA) and the Development Loan Fund (DLF), was recommended by the President along with a request for a $4.8 billion foreign aid program.

Incorporated in the new budget request is a plan to emphasize long-range programs in nations receiving aid. The request calls for $900 million to get the long-range program going next year.

The total budget also includes $1.7 billion for economic aid and $1.8 billion for military aid.

Import Restrictions: A Long Way Off

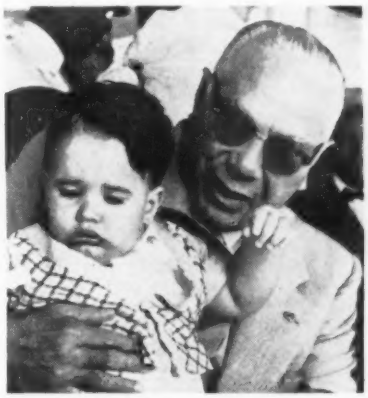
Various schemes to check foreign imports have been introduced in Congress. These plans range all the way from voluntary quotas (producing nations are expected to voluntarily cut back their shipments to the U. S.) to mandatory higher tariffs and quotas.

But there is little hope that Congress will pass—or the President sign into law—any plan that in any way inhibits imports. It is evident that the problem has to get worse before official action will be taken.

Relief for domestic industries hurt by imports is a long way off. At least this is true of relief in the form of import restrictions.

Trujillo's Death Brings Problems

The assassination of Dominican Republic dictator Generalissimo



TRUJILLO: What now?

Rafael Trujillo raises far more serious questions in Latin America than generally supposed.

It will give life and hope to leftist splinters, aid and abet Communism, and generally create chaos in South America. It may even step up the export of Castroism.

All this will run head-on with the Administration's attempt to bed down the South American troubles with the approved $500 million for "good deeds."

Renault Sales Up

Imports of the Renault auto hit a 12-month high in May. According to Vincent P. Grob, executive vice president and general manager, approximately 6000 cars were shipped to the U. S. last month.

This total includes some 4300 Dauphines and 1700 Gordinis. Shipments from Renault's factory in France to the U. S. have been steadily increasing this year, says Mr. Grob. Increased shipments coincide with a rise in dealer sales here. The Renault price tag was reduced $200 not too long ago.

EF

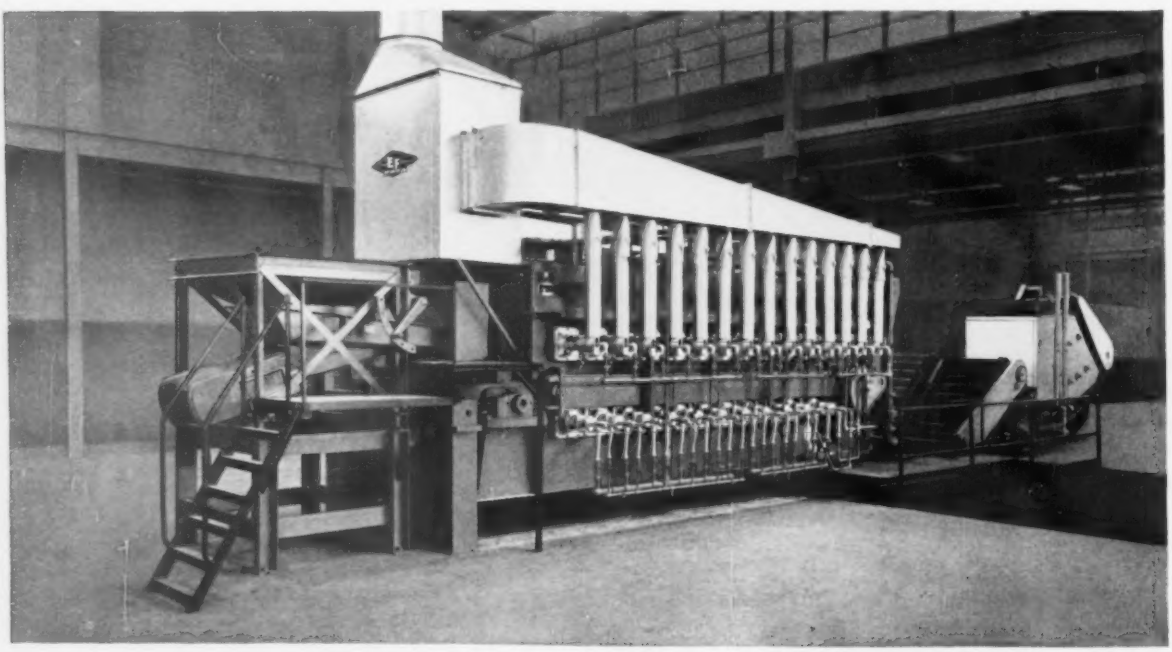
Chain Belt Furnaces

for scale-free hardening, carbon restoration, carburizing, carbon nitriding or non-decarb heat treating of small and medium size parts.

EF Chain Belt Conveyor Furnaces are ideally suited for processing a wide variety of products in a wide range of atmospheres. Their initial cost is moderate. Operation is almost completely automatic, minimizing labor costs. The material is carried directly on the belt without shaking or jarring. No pans or trays are needed, thus avoiding the necessity of heating this additional weight, and assuring high fuel economy.

Available in electrically heated or fuel fired designs. 15 standardized sizes with capacities from 175 to 3000 lbs. per hour, minimize the charges for new engineering and assure prompt delivery. Easily installed. Often shipped completely assembled requiring only connection to utilities. 7 out of every 10 new orders are from previous users attesting the serviceability and dependability of our design.

Write for Bulletin No. 601. It gives full details . . . and call the EF engineers on every heat treating project. Our long experience and extensive research and development facilities can shorten your path to low cost, profitable operation.



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Fuel Fired and Electrically Heated HEAT TREATING FURNACES for Processing any Product, in any Atmosphere, any Hourly Output Required

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SALES REPRESENTATIVES—2842 West Grand Blvd., Detroit 2, Mich. • also 968 Coleman Rd., Cheshire, Conn.

Tungsten Lubricates Punch

With only 0.0001-in. clearance between male- and female-punch holders, a multi-station rotary press compacts abrasive ferrite powders into computer-memory cores. All punch holders are made from a new tungsten tool-and-die steel. Under load, the 4.0 pct tungsten in the holders produces slippery abrasion-resistant surfaces. As the press completes a revolution, its upper cam actuates eight separate punching stations.

Grinding and Hardening

Completely automatic, an integrated line hardens piston-ring centers while finish grinding 960 parts per hour. This line uses standard grinding machines and commercial induction-heating and quenching units. Modular design allows ready retooling or breakdown to suit individual jobs. Taking up little floor space, the line yields a continuous in-line flow of parts.

Automatic Casting

Reclaimable composite molds open the door to automated moldmaking and straight-line production casting. Each mold has a main body of chamotte sand. This low-cost sand forms 95 pct of the mold's volume. It's faced with a special ceramic slurry. After the mold is broken to free the casting, all of the sand backing and most of the ceramic facing can be reclaimed easily.

Centrifugally-Cast Pipe

Just approved by government codes is a centrifugally-cast austenitic stainless that serves as pressure piping in nuclear reactors. This newcomer will sharply cut the cost of heavy-duty piping for this type of service. It's in the 2500 psi, 650°F range. Hot forming can be done by bending, swaging or other standard methods.

Guards Refractory Metals

"Zinc is the most satisfactory metal in forming protective coatings for columbium alloys." This is the word from the Naval Research Lab. The protective action of a zinc-base coating hinges on the formation of tight layers of zinc oxide. Breaks in these oxide barriers heal themselves. Air reacting with columbium's zinc vapors forms additional protective patches of zinc oxide. The zinc-base coatings protect columbium at heats up to 2000°F.

Machining Diamond Dies

Russian toolmakers use electrospark machining methods to pierce small holes in diamond dies. A pulsed electron beam is emitted by a thin tungsten-wire cathode. This beam is directed onto a diamond, placed in a cup filled with an electrolyte. The electrolyte which barely covers the diamond's surface serves as an anode. Finished diamond dies draw fine hard-steel wires.

Carbide Knives Shave Rod

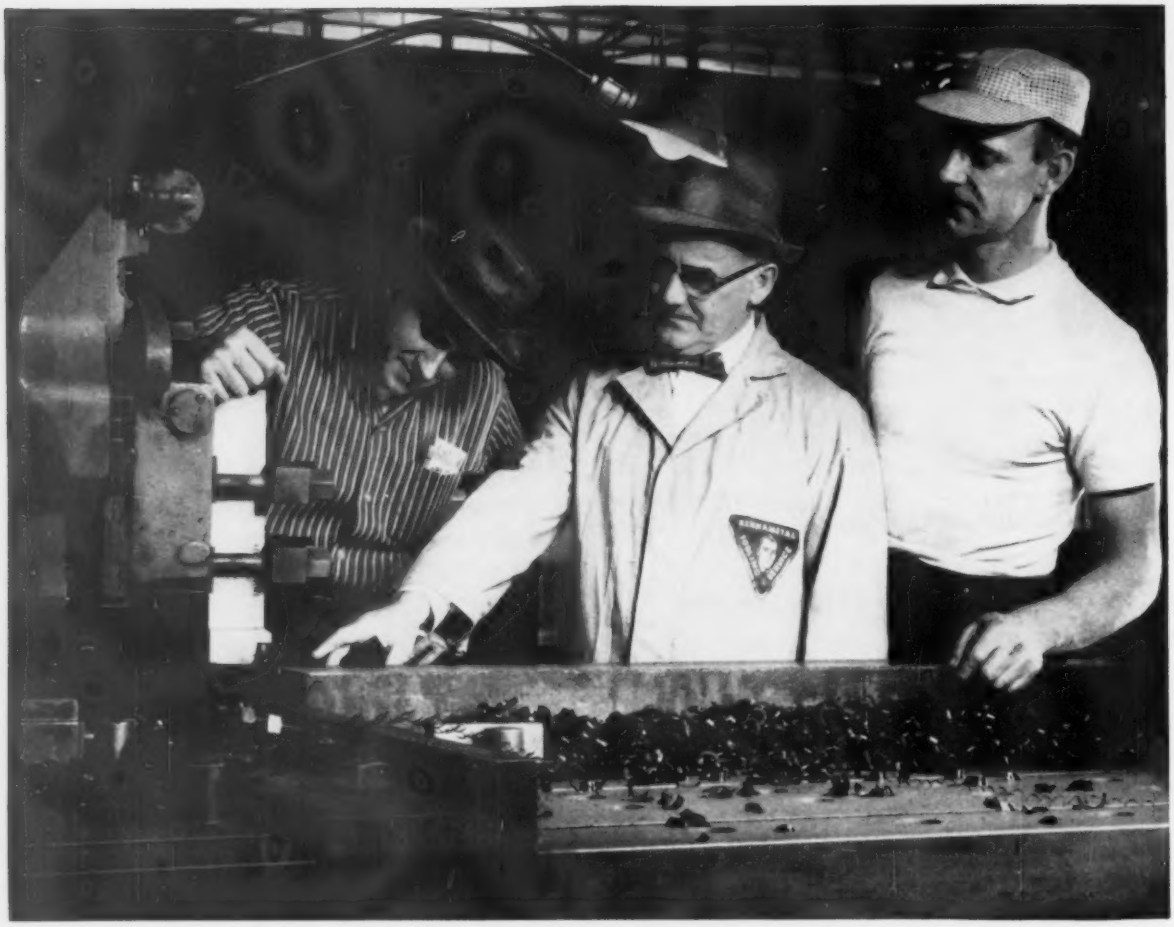
Revolving at 8000 rpm, multiple cutters on a German-made machine shave metal rods and wires at 130-fpm rates. Wire diameters from 7/32-0.687 in. can be skinned by the solid-carbide knives. Adjustable cuts up to 1/16 in. deep remove scale, decarb, fissures and cracks from rod and wire surfaces. A vertical feed eliminates gravitational forces on the shaving head's bearings. Reel loading is automatic.

Gain in Tube Welding

A new resistance welder is expected to increase tube-joining speeds by a least 20 pct. Tests made on 0.103-in. thick steel with the new unit reveal welding speeds of 80 fpm at 100 pct power input. A conventional welder used in the same test produced welds at 50-fpm rates.

Adhesive-Backed Stainless

Self-adhesive stainless foils can be used without any mechanical fasteners. A high-tack pressure-sensitive surface is provided on the back of the 0.003-in. thick stainless. Recommended uses include: Decorative panels, splash guards, kick plates and other commercial and industrial applications. To apply a stainless coating, all you need to do is peel away a paper cover.



Shop Superintendent—Kennametal Carbide Engineer—Machine Operator

3-man team solves operating problem
...standardized on one insert for all tools —increased production—reduced downtime

PROBLEM: Original carbide insert (not Kennametal), used in machining a wide range of alloy steels on Gray double-cut planer, had complicated shape; could be used only in special head; different inserts were required for other heads. Thin cross section resulted in costly downtime due to breakage.

SOLUTION: Simplified change in tool geometry, recommended by 3-man team, permitted use of Standard Kennametal* carbide insert.

RESULT: Required only one type of Kennametal insert for all tools. Reduced downtime through increased thickness of insert. Provided easier indexing and greater depth of cut. Insert cost for new setup is 60% less than previous insert cost.

That's the kind of product and service that you can get through your Kennametal carbide engineer.

Thoroughly trained in carbide products, he devotes his time exclusively to the sale and application of Kennametal hard carbides . . . and is well qualified to provide on-the-spot analysis and recommendations. If your job requires unusual or special design, engineering and application service, your Kennametal man will make our headquarters engineering and manufacturing facilities available.

Depth of on-the-job experience —plus the continuing development of a variety of tungsten, titanium, and tantalum carbide grades—has lead to the use of Kennametal compositions in practically every industry. And our product development group, by working in close cooperation with design engineers, sales engineers and customers, keeps coming up with new products and new applications—engineered and developed to meet both general and specific customer requirements.

We believe you will be interested in our booklet, "There's Profit in Retiring a Tradition," which gives facts on how some companies have reduced machining costs as much as 70 per cent. Based on actual cases, it makes practical and profitable reading. Ask your Kennametal Carbide Engineer for a copy . . . or write direct to KENNAMETAL INC., Dept. IA, Latrobe, Pa.

*Trademark

33552

INDUSTRY AND KENNAMETAL ...Partners in Progress

Editorial Praise

Sir—Congratulations on your recent editorials and especially for "Freedom Is Dying: The Reds Are Killing It" (IA—May 4, '61). This type of editorial should help to awaken us to the fact that we are already in World War III.

Winning debates in the United Nations sessions and distributing our wealth among the nations of the world certainly has gained us little and our losses have been staggering. Keep up the good work.—Stephen J. Pope, Spokane, Wash.

Sir—I have read your editorials quite regularly for some time. I like them because they are factual and full of food for thought.

The recent one on the Peace Corps ("The Peace Corps: It Requires Realism," IA—April 20, p. 5) is exceptional and I wish it could be given with emphasis to each member of the Corps to read. These young people, targets of professional communist activities, can unknowingly become the wrong picture to those with whom they will be living.

Your April 27 editorial entitled "Soviet Strategy: It's a Long-Term Headache" should have been entitled "Soviet Strategy: It's a Short-Term Tragedy." Mr. K's time table calls for 1973 as the date of U. S. conquest. Many students of communism say it will even be less than the 12 years.

I admire your patriotism in the last paragraph, but let's face the facts and fight harder now in word and deed. Later will be too late. We have never before met an enemy of this kind.—Charles Uhden, Spokane, Wash.

Sir—As a contributor to your magazine some years ago and as a metallurgist who has read your magazine for many years, I would like to congratulate you on your editorial "Freedom is Dying: The Reds Are Killing It" (IA—May 4, '61, p. 5). You certainly have hit the nail on the head. Would you send me a few tear sheets of the editorial to circulate among friends? Do you have any suggestions as to what we can do about the situation? —Ed Coe, Ford Motor Co., Detroit, Mich.

▪ The tear sheets will be sent.—Ed.

Sir—I have just read your editorial on p. 5 of the May 4 issue of The IRON AGE ("Freedom Is Dying: The Reds Are Killing It"). I believe you have summed up in as few words as possible the most important problem facing man today. I only regret that The IRON AGE is not a mass media publication.—L. R. Murphy, United States Gypsum Co., Chicago, Ill.

Trade Schools

Sir—We should like to obtain 12 copies of the article in the April 6 issue of The IRON AGE by P. J. Cathey entitled "More and Better Trade Schools Needed to Boost Skills, Jobs." Are reprints available?—J. E. Brookins, Oakland City College, Oakland, Calif.

▪ The reprints will be in the mail soon.—Ed.

"I didn't know what a good job was until I took this one—Then it was too late."

IF you're making plans for a new model or new product, soon to be launched into sales orbit, let Southern fasteners help assure its success. Sales, in great part depend on quality fasteners that hold your product together.

Southern specializes in the manufacture of quality fasteners made in USA with USA materials. Build quality into your products with Southern fasteners.

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NOW...

Consider the most versatile zinc-coated steel yet produced

...NEW ARMCO

It's durable, paintable, weldable

Spangle-free Armco ZINCGRIP® A, PAINTGRIP® is a new zinc-coated steel prepared at the mill to take a smooth, lasting paint finish right after fabrication.

Three years of outdoor tests demonstrate paint adherence and paint life that's superior to phosphate-treated cold-rolled steel and all other zinc-coated steels prepared for painting. In addition, when paint is damaged or where there's no paint at all, the zinc coating on ZINCGRIP A, PAINTGRIP locks out rust.

Twice as many spot welds can be made as on ordinary galvanized steel before electrode tips need redressing. And this new grade is just as workable as ductile Armco ZINCGRIP—the zinc-coated steel that has proved itself in severely drawn and formed products for a quarter-century.

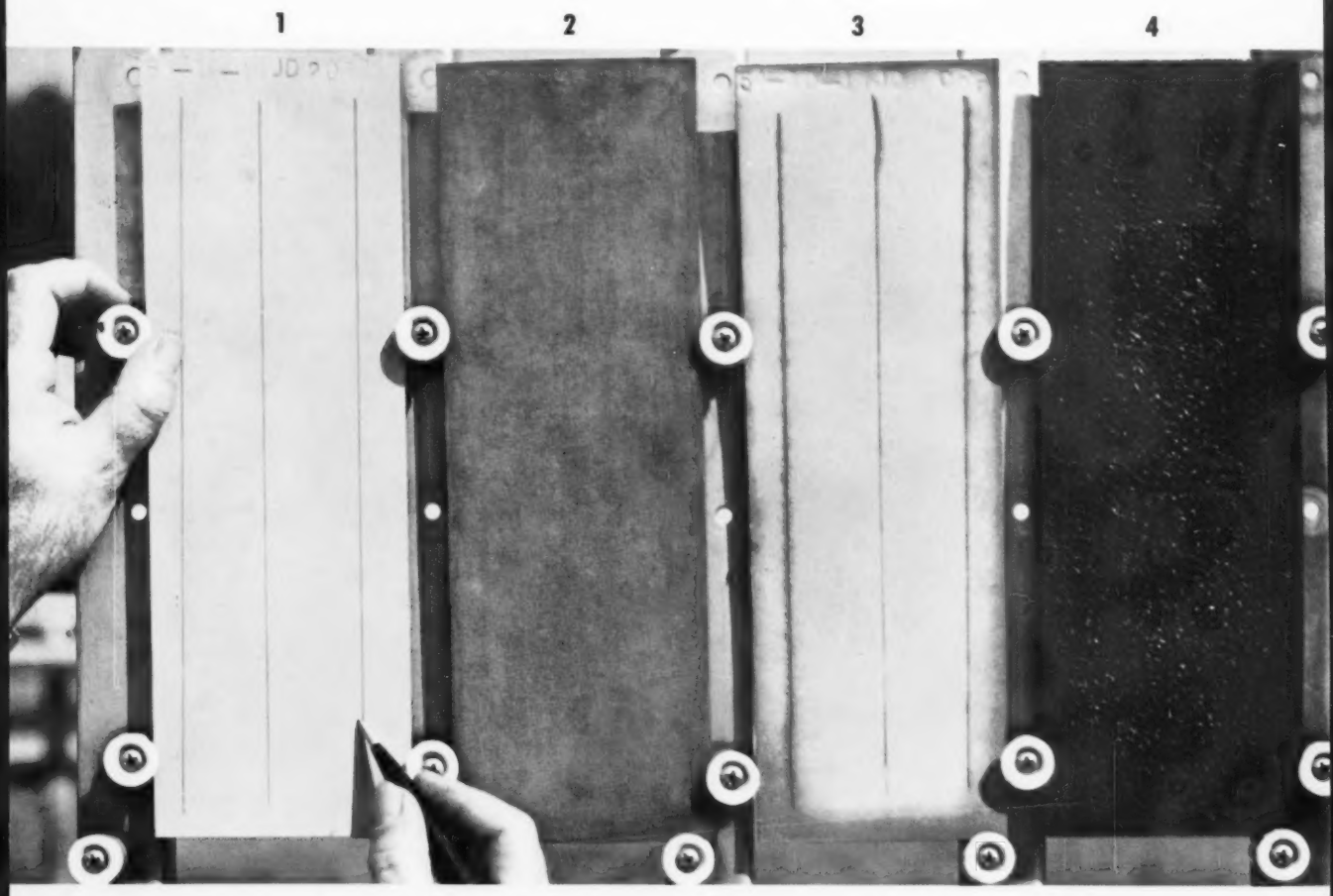
New Armco ZINCGRIP A, PAINTGRIP is available *now* with 1.25 oz. per sq. ft. class coating or light commercial coating; in 16 to 24 gage cut lengths and coils up to 48 inches wide, depending on gage. Write for more details. Armco Division, Armco Steel Corporation, 1981 Curtis Street, Middletown, Ohio.

ARMCO Armco Division

Rust-resistance and spangle-free paintable surface mean lasting good looks in applications such as these.

New steels are born at Armco

ZINCGRIP A, PAINTGRIP



This half-painted bus body fabricated from Armco ZINCGRIP A, PAINTGRIP has been exposed for 2½ years. Paint finish is still smooth and attractive, the unpainted surface rust-free.

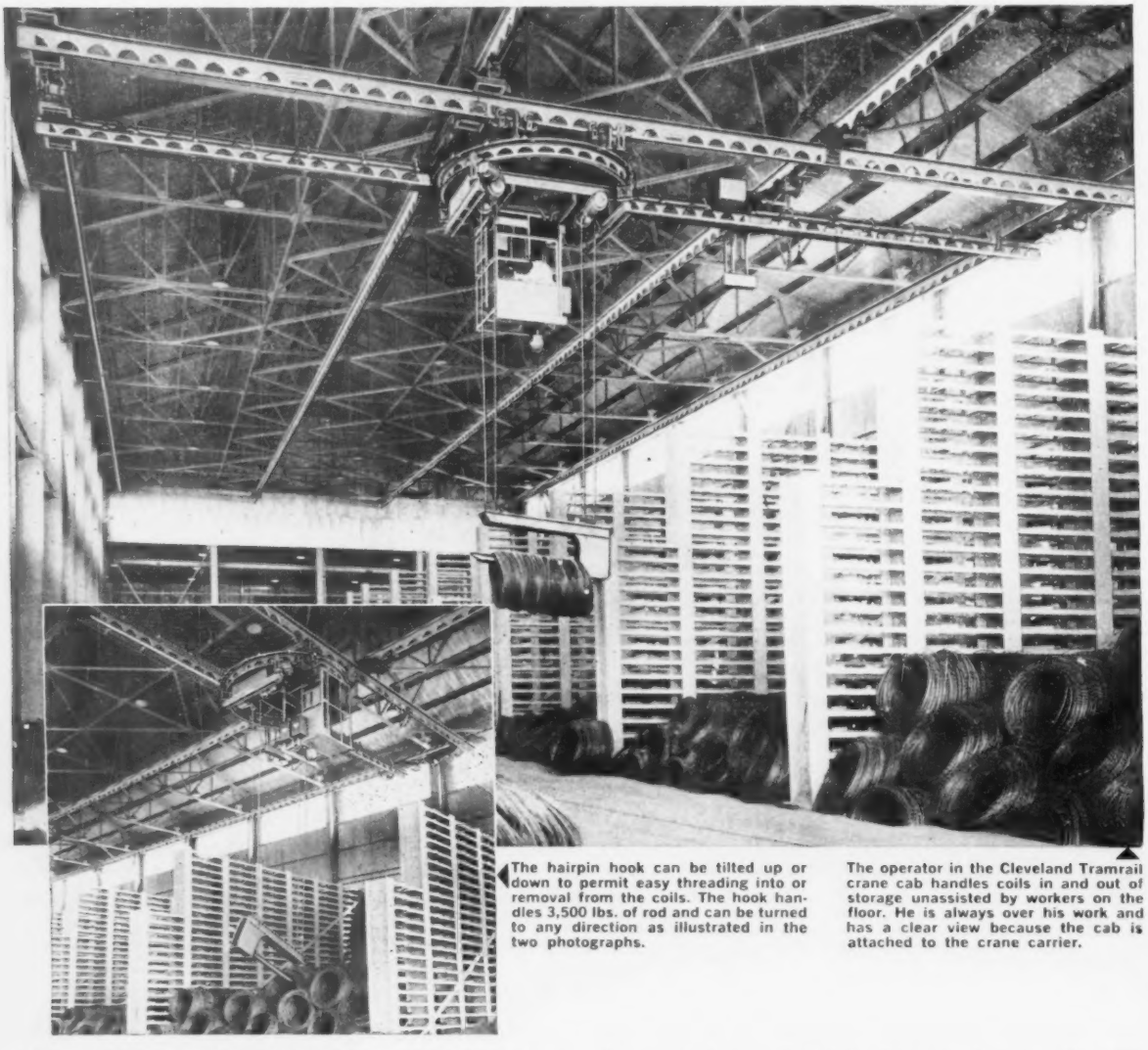
After 3-years' exposure outdoors, paint holds tightly to sample of Armco ZINCGRIP A, PAINTGRIP (1), even where scratched at start of test. Where unpainted (2) there's no rust either. In contrast, painted and unpainted phosphate-treated cold-rolled steel panels (3 and 4) are in poor condition. Paint has been undercut. Rust is entrenched.

Galvanized Steel

Use this label to point out durable zinc-coated steels in your products

Crane with ROTATING CARRIER

Provides Ultimate In Wire and Rod Handling Efficiency



The hairpin hook can be tilted up or down to permit easy threading into or removal from the coils. The hook handles 3,500 lbs. of rod and can be turned to any direction as illustrated in the two photographs.

The operator in the Cleveland Tramrail crane cab handles coils in and out of storage unassisted by workers on the floor. He is always over his work and has a clear view because the cab is attached to the crane carrier.

Five motions: hoisting, tilting, trolley travel, bridge travel and rotation are provided in a Cleveland Tramrail crane for handling coiled rod. The trolley travels on a 76-foot double-girder crane bridge from side to side of a building. A rotating carrier operates on a circular track built into the trolley. It turns unlimitedly in either direction. The crane travels on four runway tracks and is controlled from a cab which is attached to the carrier.

Coiled rod is picked up from incoming railroad cars by a hairpin-type hook and turned 90 degrees for placement into large bins along one side of the storage building. The hook can be tilted either up or down for threading into or drawing away from the coils.

The unit handles 3,500 lbs. of rod in addition to the weight of the hairpin hook. Bridge and trolley control are variable five-speed magnetic with dynamic braking. Hoist control is variable-speed drum type with dynamic lowering. Rotating control is automatic accelerating.

With a wealth of experience to draw on, Cleveland Tramrail engineers are in position to help you with a wide range of materials handling problems. We welcome an opportunity to work with you.

Write for free booklet No. 2008

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4830 E. 288 ST. • WICKLIFFE, OHIO

Our Man in Chicago

The Midwest is the heartland of metalworking in the U. S. As such, it probably has more metalworking companies than any other comparable section anywhere in the world.

Giant metalworking and metal-using companies call it home. But flourishing side by side with the giants are thousands of small companies.

Good Combination—What better place, then, to home in on for a story asking: "Is there still room for the small company?"

And what better man to look into it than our Chicago editor, Keith Bennett?

Keith has been our man in Chicago for over nine years. And in that time he has come to know hundreds of people at hundreds of companies in Midwest metalworking.

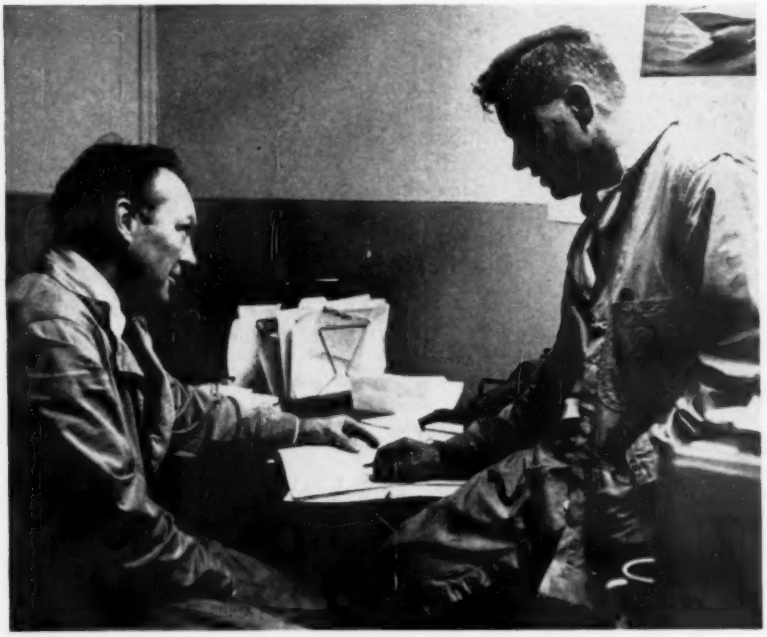
And as proof of his versatility, you only have to look at his work of the past few weeks.

What They Need — For this week's cover story, he interviewed top executives at a number of small companies to find out what it takes for a small company not only to survive, but to prosper in a period when the emphasis is on bigness.

The story, which begins on p. 59, is "Small Business Can Still Make a Go of It."

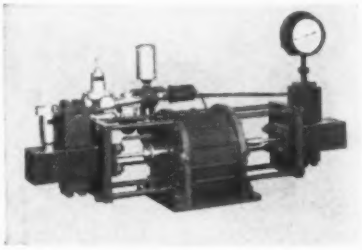
And just a week ago, Keith wrote the cover story on "How Quick Reaction Capability Speeds Product Development." (See IA, June 1, p. 47.)

While the companies in that story are much larger than any of those which form the basis for this week's cover, the basic ingredients are the same: Metalworking executives and metalworking companies in the Midwest—and an editor who knows them.



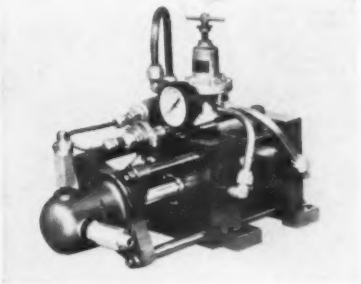
TELLTALE COATS: It's easy to tell the executives from the office workers at Camcraft, Inc., producers of precision automatic screw machine products, and one of the small companies in this week's cover story: President W. A. Hawley (left) and partner J. W. Hansen often wear shop-coats. But when out in the plant, which is often, they look like the workers.

Need reliable hydrostatic testing to 50,000 psi?



Ordinary pumps just won't do. To handle fluids at pressures up to 50,000 psi and beyond, it takes the rugged dependability of an Aldrich heavy-duty, 6″ stroke pump. Powerful yet compact, this unit is the right answer for high pressure equipment on production lines or in the laboratory.

Service—hydrostatic testing of tubing, valves, pressure vessels; operation of hydraulic presses, cylinders, valve positioners. Available single or double acting.

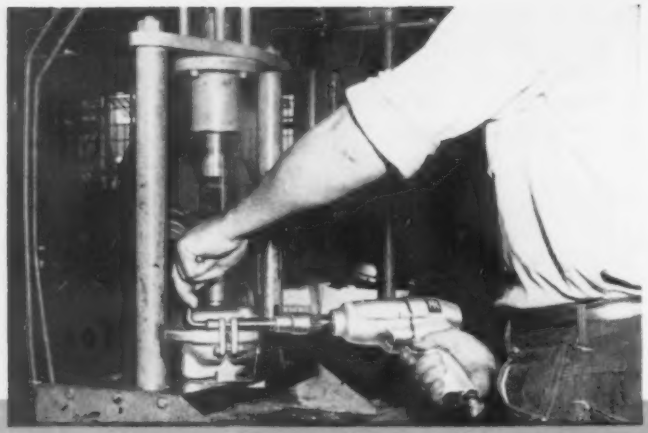


For intermittent service and pressures to 36,500 psi, the Aldrich 3″ stroke pump is ideal, offers low first cost, high reliability.

Both these Aldrich Air-Driven Hydraulic Pumps operate on normal plant air, are readily installed and economical to run. Immediate shipment from factory stock. Write for Data Sheet No. 36 (6″ stroke) and No. 36A (3″ stroke).

ALDRICH

ALDRICH PUMP COMPANY
8 Pine Street, Allentown, Penna.



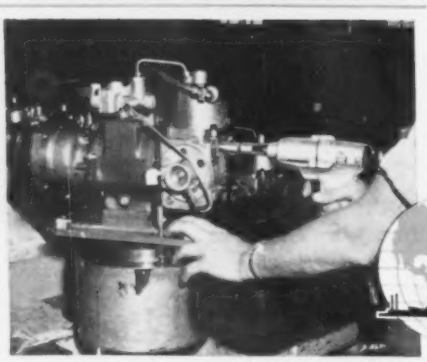
Drawing up the band on air brake chamber to 25 ft. lbs. is a precise job performed over 1¼ million times by this Ingersoll-Rand automatic shut-off Torsion Bar Torque Control Impactool.

1¼ MILLION NUTS TO 25 FT. LBS.

...and still going STRONG!

One of four Ingersoll-Rand Torsion Bar Torque Control Impactools that quickly and accurately tighten four different size fasteners to 3 different torques in cylinder-tube assembly.

Ingersoll-Rand Impactool with Torsion Bar Torque Control set at 15 ft. lbs. runs Allen pipe plug to seal 100 lb. pressure in air brake chamber.



Automatic Torque Control improved performance almost 100% by providing exact torque in tricky assembly of oil reservoir to air compressor.

On the basis of this kind of performance, this brake manufacturer took advantage of the reliable quality control features possible with Ingersoll-Rand Torsion Bar Torque Control Impactools . . . and solved a "quality bottleneck" by using them on 11 different assembly operations. Rejects were almost entirely eliminated, inspection time and costs were cut to the bone and production increased by 34% to 45% per manhour.

In addition to dividends earned by improved product quality and greatly reduced reject and inspection costs, the increase in production per manhour means a Dividend on Payroll Dollars of from 34% to 45% of the tool operator's wages. The other operations shown here are setting similar quality and production records!

You can calculate your own dividend with the help of Ingersoll-Rand's new, illustrated guidebook, "How to earn a Dividend on Payroll Dollars with Planned Annual Retooling" . . . and handy Dividend Computer. Call your nearby I-R Representative or write Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

Planned Annual Retooling increases output per man

61A-8

COMING EXHIBITS

Great Lakes Show—Material Handling Institute, June 19-21, Detroit.

Western Plant Maintenance and Engineering Show—July 18-20, show & conference, Pan Pacific Auditorium, Los Angeles.

Industrial Building Exposition — Sept. 25-28, New York Coliseum.

MEETINGS

JUNE

Manufacturing Chemists Assn., Inc. —Annual meeting, June 8-10, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, 1825 Connecticut Ave. N. W., Washington 9, D. C.

American Society of Mechanical Engineers—Summer annual meeting, June 11-15, Statler-Hilton Hotel, Los Angeles. Applied mechanics conference, June 14-16, Illinois Institute of Technology, Chicago. Society headquarters, 29 W. 39th St., New York 18.

Industrial Engineering Seminars—June 13-16, Cornell University, Ithaca, N. Y.

Society of Plastics Engineers, Inc.—Regional technical conference, June 14, Montreal, Canada. Society headquarters, 65 Prospect St., Stamford, Conn.

Drop Forging Assn.—Annual meeting, June 14-17, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, 1121 Illuminating Bldg., Cleveland.

National Assn. of Secondary Material Industries, Inc. — Midwestern Div. regional meeting, June 15, Statler-Hilton Hotel, Cleveland.

Pressed Metal Institute—Sales conference, June 15 - 16, Bedford Springs Hotel, Bedford Springs, Pa. Institute headquarters, 3673 Lee Rd., Cleveland.

(Continued on P. 24)

You Get **Spring Steels**
WIDER...In Any Thickness
from **UDDEHOLM**

Obtain prompt delivery from warehouse stocks, of popular grades such as Blue Tempered-Annealed, in widths from ⅛" to 16¼" – thicknesses from .001" to .125", as shown in the graph. UDDEHOLM SWEDISH Spring Steels have extra built-in advantages – excellent flatness and finish, close tolerances, uniform hardness and analysis, longer fatigue life! Modern edge-finishing and slitting facilities satisfy your needs exactly!

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Don't take chances on couplings

CHECK PUBLISHED MISALIGNMENT RATINGS BEFORE YOU BUY

Since misalignment is the basic problem that shaft couplings are designed to solve you'll find a published conservative misalignment rating (along with load capacity rating) for every Fast's Coupling. Compare it with the misalignment rating of any other coupling you are considering.
One further advantage of Fast's Couplings' misalignment ratings: You save money on installation because, knowing the ratings, you don't have to line up driving and driven elements with pinpoint accuracy. It's one more important reason why Fast's Couplings are the choice of more equipment manufacturers than any other gear-type coupling.
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Engineered Products Sold with Service

For the best in pressure spray washing

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Even the highest spray washer pressures won't foam Oakite 161 alkaline detergent

Turn on the highest pressures to speed cleaning—you won't get any foaming problems with Oakite 161. Nor any etching problems, either. This alkaline detergent is specially designed for *safe* pressure spray washing of any metal—aluminum, white metals, brass, steel.

And it does a thorough job. Oakite 161 blasts off identification inks, grease, oil and shop soils . . . gives a completely clean surface for inspection or final finishing. Costly? Not at all. Extra long solution life and low concentrations assure low per-unit production costs.

One of a complete line of Oakite products for spray washers, Oakite 161 is complemented by heavy-duty solvent cleaners, moderate to light-duty alkaline materials. Ask the Oakite man to help you make the choice that's right for your washer . . . right for your products. Or send for Bulletin F-9773. Oakite Products, Inc., 24 Rector Street, New York 6, N. Y.

it PAYS to ask Oakite

OAKITE

over 50 Est. 1909 SCIENCE

years' leadership in industrial cleaning

MEETINGS

(Continued from P. 23)

National Assn. of Metal Finishers—Annual Convention, June 16-19, Boston.

Material Handling Institute, Inc.—Meeting, June 18-20, Hilton Hotel, Pittsburgh. Institute headquarters, One Gateway Center, Pittsburgh.

Alloy Casting Institute — Annual meeting, June 18-20. Institute headquarters, 1001 Franklin Ave., Garden City, N. Y.

American Electroplaters' Society—48th Annual convention, June 18-23, Statler-Hilton Hotel, Boston. Society headquarters, 445 Broad St., Newark, N. J.

Investment Casting Institute—Advance technical meeting, June 20-21, Case Institute of Technology. Institute headquarters, University Circle, Cleveland.

Electric Overhead Crane Institute—Meeting, June 21, Detroit Athletic Club, Detroit. Institute headquarters, One Thomas Circle, Washington 5, D. C.

National Tool & Die Manufacturers Assn.—Summer meeting, June 21-25, Schroeder Hotel, Milwaukee. Assn. headquarters, 907 Public Square Bldg., Cleveland.

American Society for Testing Materials—Annual meeting, June 25-30, Chalfonte - Haddon Hall, Atlantic City, N. J. Society headquarters, 1916 Race St., Philadelphia.

American Vacuum Society — 5th Annual conference, June 26-27, Heights Campus, New York University, New York.

JULY

Cast Iron Pipe Research Assn.—Annual meeting, July 26-27, Seaview Country Club, Absecon, N. J. Assn. headquarters, Prudential Plaza, Suite 3400, Chicago.

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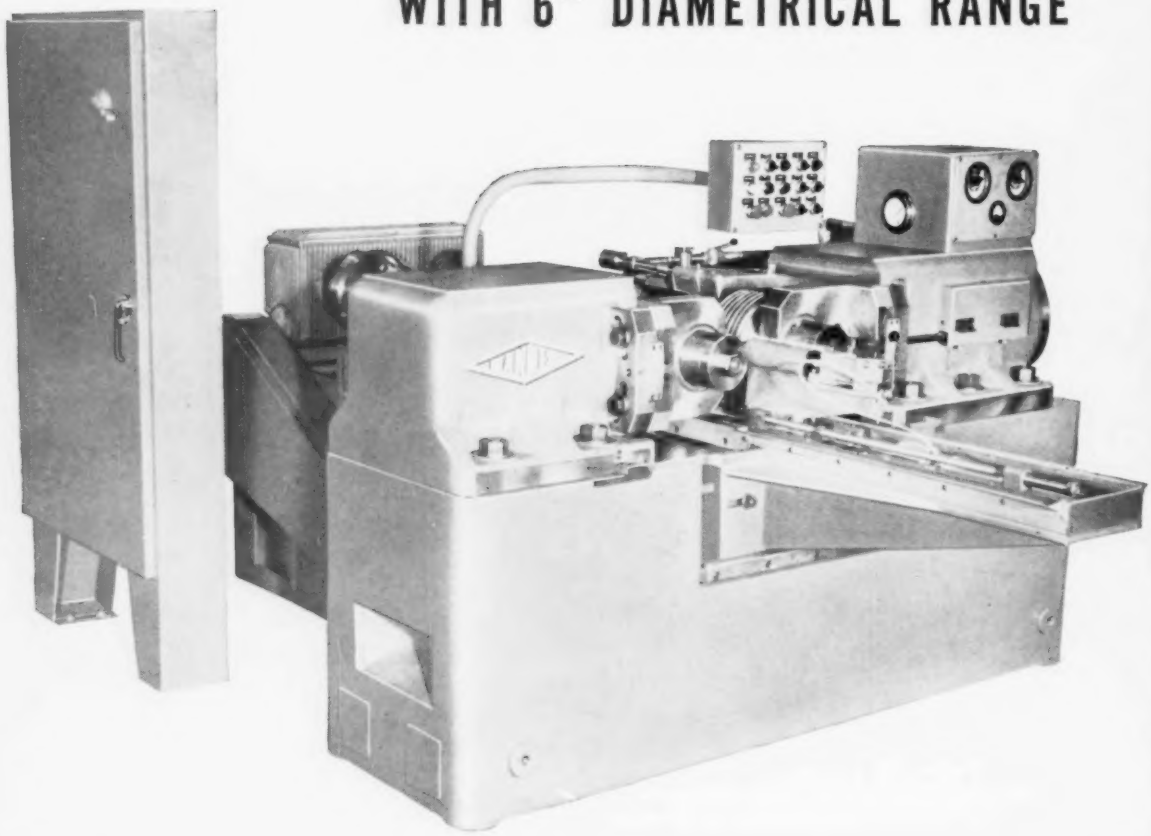
To qualify for a Federal ball bearing, a steel ball has to be more than simply spherical to within 0.000025" and the right diameter to within 0.00005". It's got to be tough! A ¼"-diameter ball, for instance, must withstand a minimum of 4400 pounds of pressure. Whether it's going into a radial, angular contact, thrust, self-aligning or shafted bearing. Single or double row. Open or sealed. No wonder Federal numbers so many top industrial names among its satisfied customers. Our catalog describes hundreds of ball bearing types in all sizes. Send for it today. The Federal Bearings Co., Inc., Poughkeepsie, New York.

THREAD ROLLING MACHINE

delivers 200,000 pound rolling force

WITH 6" DIAMETRICAL RANGE



NEW

. . . from Landis Machine Company, the world's largest manufacturer of threading equipment, comes the HY-DUTY Thread Rolling and Forming Machine. With an all-steel bed, it is designed for the heaviest thread, form, spline and gear rolling applications . . . even those requiring rolling forces of up to 200,000 pounds.

With hydraulically operated, infinitely regulable and electronically-controlled infeed cycling and variable infeed stroke length, the machine is exceptionally versatile in application. It offers power, rigidity and speed for maximum efficiency within its rated capacity. The HY-DUTY will thread and form up to 6" maximum diameter INFEED, and up to 4" maximum diameter THRUFEED. A full complement of automatic feeding and tooling equipment is available for rolling by either method.

The HY-DUTY Machine complements the medium size LANHYROL and small LAN-NU-ROL Thread Rolling Machines allowing LANDIS to offer a complete line of thread rolling equipment. Whatever your thread rolling requirement, there is a LANDIS machine or tool to do the job. This is the result of over 55 years of experience in the threading field. For additional information about the HY-DUTY Machine, contact your LANDIS Representative (in all leading cities) or write direct for Bulletin E-104.

HY-DUTY FEATURES:

- Manual, semi-automatic and automatic die cycling
- High infeed cycling rates—up to 25 strokes per minute (fully automatic)
- Two die design to minimize set-up time and auxiliary equipment
- 50/25 H.P., 1800/900 R.P.M., motor and 12 spindle speeds ranging from 39 to 476 to provide the power and speed to efficiently roll all diameters within the machine's range
- Maximum thread lengths of 11½" for Infeed rolling, up to 20' Thrufeed
- Roll holders inclinable to 10° in either direction to include the helix angle of any standard AN/UN or Acme thread within the Thrufeed capacity of the machine
- 3" steel plate major bed for maximum mechanical stability
- Worm gear transmission and speed change gear box rated 90% efficient at maximum speed with overload capacity of 100%

LANDIS Machine COMPANY

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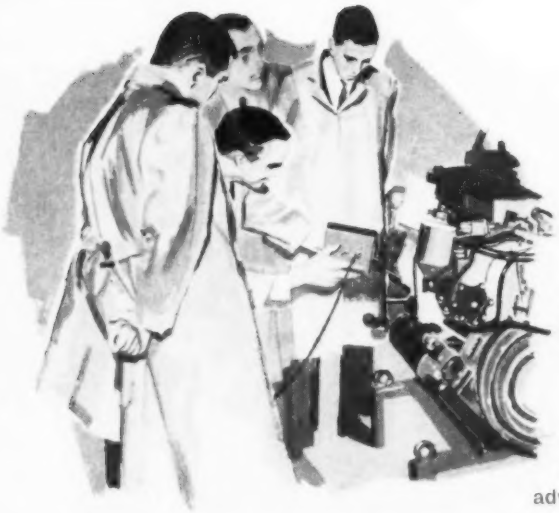

The American Oil Company representative who calls on you receives special training in servicing industrial and fleet customers at our Sales Engineering School. His training begins with a concentrated course in petroleum product quality and application. According to a planned schedule, he returns for an advanced course and then again for post-graduate work. From our Marketing Technical Service Department, your American Oil representative draws assistance, when needed, from specialists who are recognized authorities in their fields. These specialists may be called in at any time to work with you on your lubrication problems. More than a thousand research scientists and technicians at our research laboratory support the effort of our representative to serve you. Their mission: To help your American Oil representative help you lower your maintenance costs and stretch your maintenance dollars. Learn more about American Oil, its men, its service, its products.

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The man who heat treats many different tools . . .

can realize major savings with Crucible's new Tool Steel Service.

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he'll now be able to heat treat many more tools at one time.

He'll know exactly how each grade responds to heat treating.

—so he'll certainly get more consistent results by employing time-tested techniques.

All by standardizing on a few basic tool steel grades!

To find out how this new Tool Steel Service can cut your heat treating costs, call in a CRUCIBLE Service Engineer.

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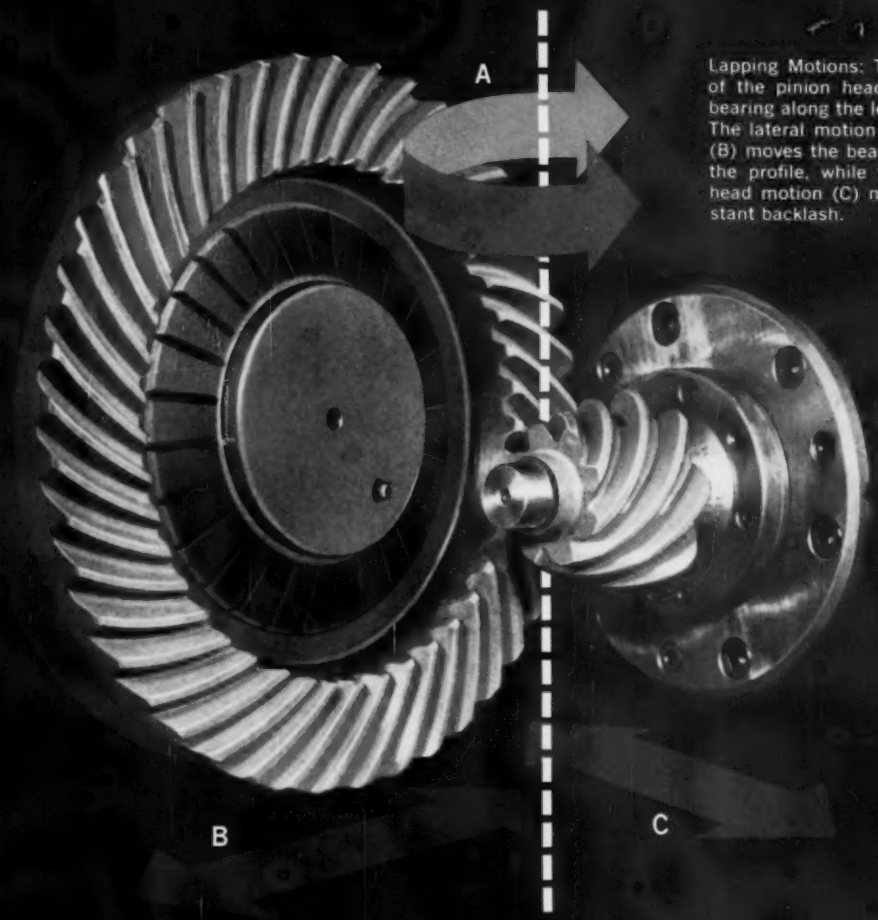
CRUCIBLE STEEL OF CANADA, LTD., SOREL, QUEBEC, CANADA



Lapping Motions: The swing motion of the pinion head (A) sweeps the bearing along the length of the tooth. The lateral motion of the gear head (B) moves the bearing up and down the profile, while the lateral pinion head motion (C) maintains the constant backlash.

New "Swing Pinion Cone" motions lap gears to 26" diameter automatically

Several design innovations in the new Gleason No. 504 Lapper combine to offer you a *more flexible* machine, *more accurate* results; a machine that will give you *more consistent* gear sets.

The new *SPC** motions allow a more rigid design—and the gear tooth surface responds more quickly and more consistently than to the previous types of lapping motions. Production rates are substantially increased.

The swinging motion of the pinion head sweeps the tooth bearing area along the length of the tooth, while horizontal motions of both heads move the bearing up and down the tooth profile, while maintaining uniform backlash.

Servo Controls provide for simpler setup and operation, and further contribute to increased speed and accuracy. All lapping motions are established by simple dial settings. This electrical control is positive and fast acting.

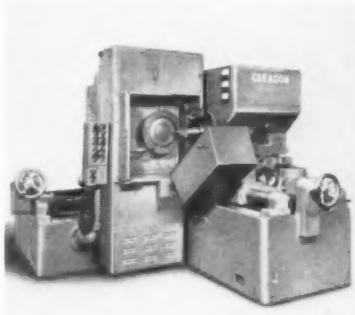
You can lap hardened spiral bevel and hypoid gears with 90° shaft angles, and conventional gears with shaft angles from 50° to 110°. Add an angle plate for the pinion head and you extend the work range from 10° to 160°.

An optional variable speed drive motor permits spindle lapping speeds from 200 to 2000 RPM.

No cams or special parts are required from job to job other than arbor equipment.

For more information and specs, write us. We'll be glad to send full details promptly.

*SPC means "Swing Pinion Cone."



No. 504 Hypoid Lapper

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Free your roll shops for redressing and leave the finishing to us

Is roll finishing straining the profitability of your roll shop operations? Many roll users have lowered operating costs by ordering finished rolls from National, leaving their shop facilities for redressing. They've found National's modern, fully equipped roll shop economically meets all requirements for precision finishing of plain or grooved rolls. They know experienced men such as sales representatives John Patton and Bill Mason, pictured above, shoulder the responsibility for roll quality from "spec" to finishing. On your next order for steel, iron or nodular iron rolls order them finished by National. You'll see why . . . NATIONAL'S THE GROWING NAME IN ROLLS.

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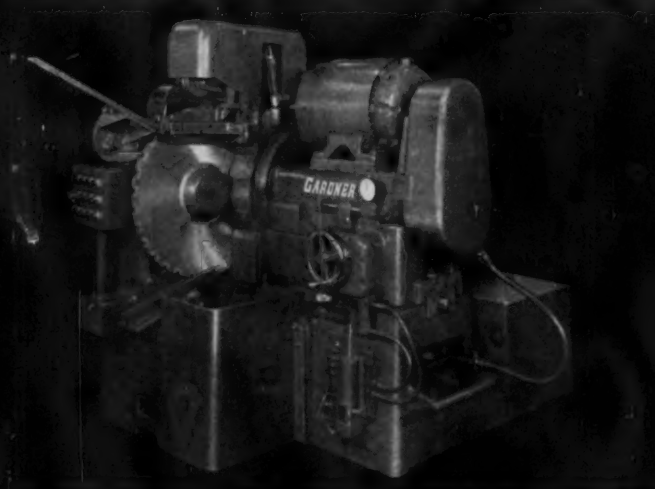
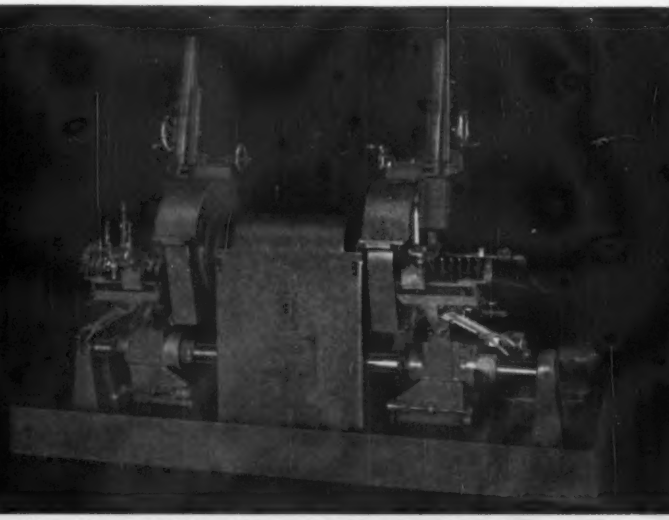
from the world's most complete line of disc grinders:

standard and specially engineered machines for a wide variety of disc grinding jobs

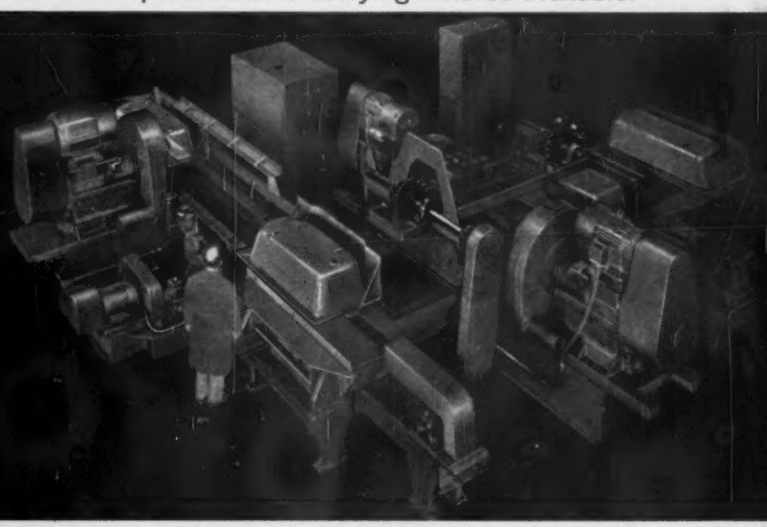


Consistently close tolerances, high rate of production on precision double spindle disc grinders. Five sizes available.



Single spindle disc grinders for production grinding single surfaces. Manual and power operated work-carrying fixtures available.

Grind small precision parts at high production on this vertical double spindle disc grinder which grinds two surfaces parallel in one operation.



Grind unusual workpieces—like bathtubs—on Gardner Special Purpose Grinders which grind surfaces parallel, generate curved surfaces, single or multiple surfaces.

GARDNER

precision disc grinders

GARDNER MACHINE COMPANY, BELOIT, WISCONSIN

a subsidiary of Landis Tool Company

NOW! Carpenter makes

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IN ADDITION TO being a leading producer of top-quality welded stainless tubing and pipe for 34 years, Carpenter now makes a full line of fine SEAMLESS Stainless Tubing and Pipe. Whichever it takes for best results in heat transfer equipment, process piping, tubular mechanical parts, structural units or other applications . . . Carpenter makes it!

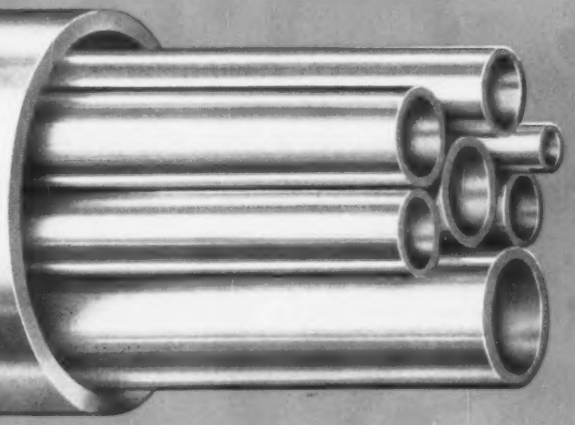
Made by best extrusion process

Carpenter SEAMLESS Stainless Tubing and Pipe are made with the accent on quality and uniformity at every stage of manufacture from raw materials to finished products. They are initially hot-formed by the highly perfected Ugine-Sejournet patented extrusion process. Stainless alloys for making these new products are produced in Carpenter's own specialty steel mill to closely balanced analyses. Extremely uniform structure and utmost freedom from internal flaws due to segregation and center line weakness are assured in these stainless steels by Carpenter's exclusive MEL-TROL® process. Cold finishing of all Carpenter SEAMLESS Stainless Tubing and Pipe assures extremely close accuracy of O.D. and I.D. dimensions, excellent physical properties and super-smooth surface finishes. Optimum corrosion resistance and working properties are made certain by careful annealing, pickling and passivating under strict quality control. Final tests and inspections insure that the finished SEAMLESS stainless products will always be "as ordered" and capable of giving the dependable, cost-saving service expected of them. Quality is a tradition with Carpenter!

Wide range of types and sizes

Carpenter makes SEAMLESS Stainless Tubing and Pipe in a full range of standard analyses, including Carpenter Stainless No. 20Cb. Tubing Sizes range from ¼" through 6⅝" O.D. with wall thicknesses of .004" to .864". Pipe Sizes are ⅛" to 6" in Schedules 5, 10, 40, 80, 120, 160 and Double Extra Heavy. Surface Finishes ranging from as-drawn to 320-grit polish can be provided on the I.D. and/or O.D. as required. Tubing of all types and sizes is regularly furnished in lengths up to 45 feet. Longer lengths are available within certain specifications. Carpenter SEAMLESS Stainless Tubing and Pipe can be supplied to meet ASTM, AMS and Government Specifications and also to meet individual users' special requirements. This new Carpenter service on SEAMLESS stainless tubing includes various shapes other than round, integral-finned tubes and bi-metallic tubes of various ferrous and non-ferrous combinations. The right answers to a wide variety of corrosion and high temperature problems in heat transfer equipment, process piping systems and hollow mechanical parts are provided by the broad range of SEAMLESS Stainless Tubing and Pipe available from Carpenter.

STAINLESS TUBING & PIPE



Available from stocks!

Popular types and sizes of Carpenter SEAMLESS Stainless Tubing and Pipe, including Heat Exchanger Tubes, can be shipped promptly from large warehouse stocks in principal U. S. cities. Large or small orders can be cut to exact specified lengths. Orders for non-stocked types and sizes will get best mill delivery available anywhere. Call or write your nearest Carpenter Representative, Warehouse or Distributor for up-to-date Stock List.

"One call does it all"

As a producer of both seamless and welded stainless tubing and pipe, Carpenter offers an unusually broad scope of impartial service on these products: Nation-wide availability from stocks; experienced assistance with matching stainless pipe and tubing to job conditions for best all-around results; technical help in solving corrosion, high temperature, fabrication and other problems; recommendations for improving the cost-life ratio of existing stainless pipe and tubing applications; dependable mill performance on special requirements. A new Selecting and Buying Guide, Bulletin 128, on Carpenter Stainless Pipe and Tubing —Seamless and Welded—is available on request to The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

selection geared to service

Carpenter **steel**

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Export Dept., Port Washington, N. Y.—"CARSTEELCO"
Alloy Tube Division, Union, N. J.
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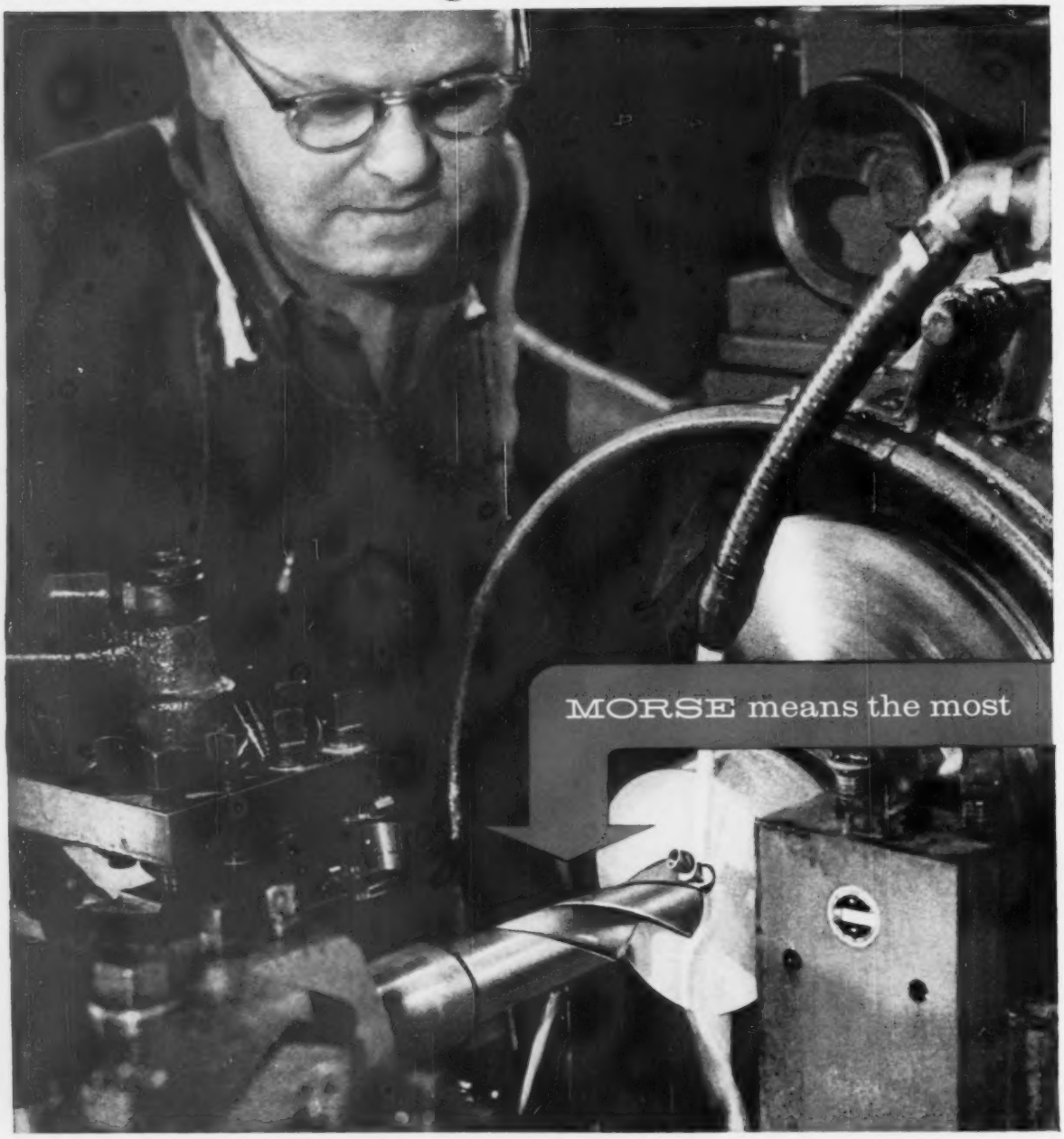
Carpenter Steel of New England, Inc., Bridgeport, Conn.

with men who know cutting tools... it's MORSE everytime



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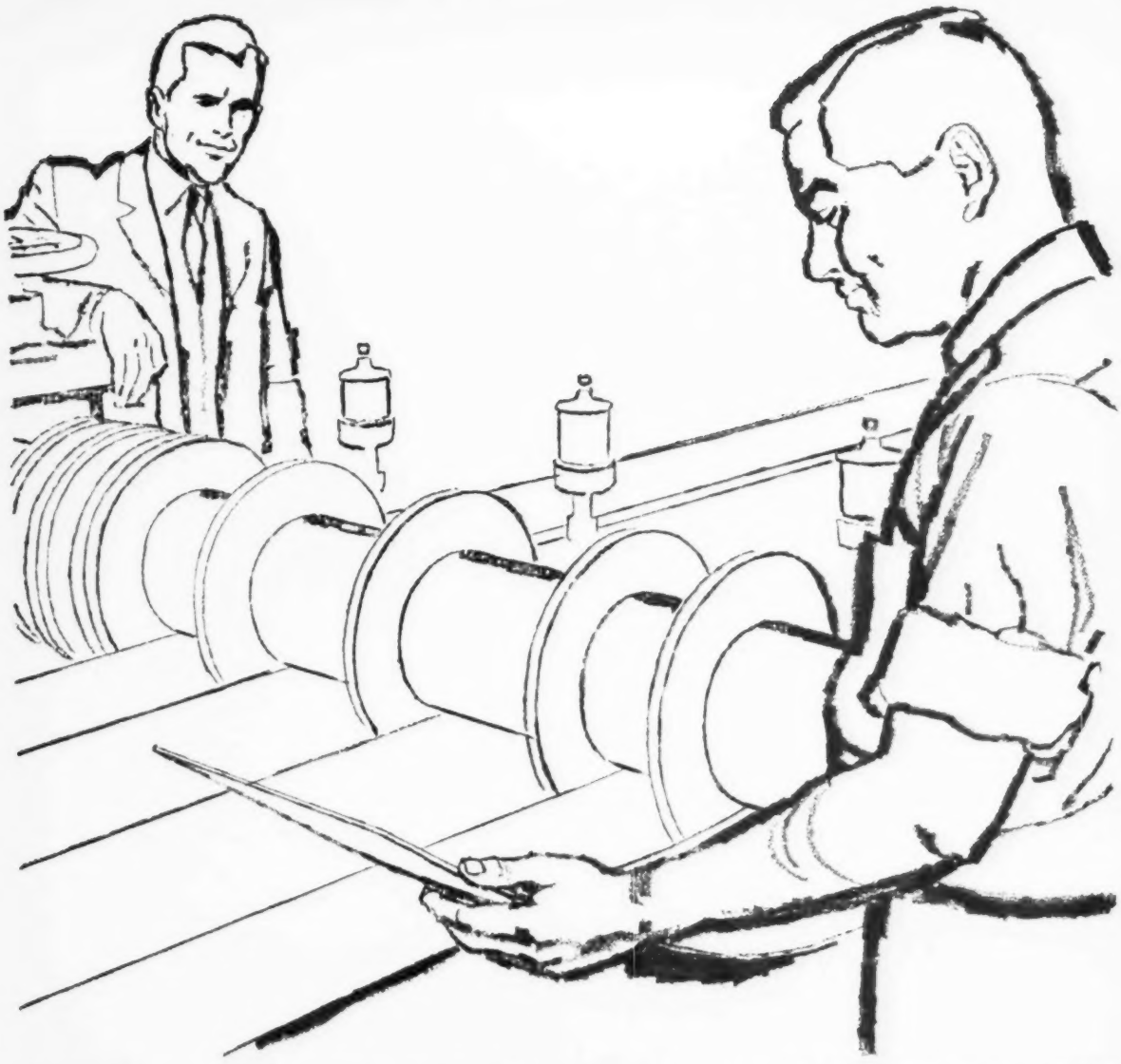


Can you get longer edge life from your SLITTER KNIVES?

A·S·K for the answer!

AMERICAN SHEAR KNIFE

The answer is yes when you use slitter knives from A.S.K. (American Shear Knife Company). A.S.K. Slitter Knives last longer, stand up better under the heaviest jobs, reduce maintenance and replacement costs!

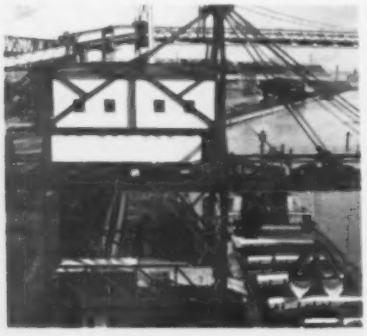
Why? Because A.S.K. has devoted years of research to the selection of proper alloys, and correct techniques in heat treating, precision grinding. For slitter knives that last longer, improve your slitting operation . . . Ask A.S.K.!

FREE HANDBOOK—Want a handy reference on the installation, operation and maintenance of slitter, shear and chipper knives? A.S.K. has the answers in an 88-page manual. For free copy, write American Shear Knife Co., Homestead, Pa.

How Dravo serves the steel industry

MATERIALS HANDLING EQUIPMENT

New 1650-ton-per-hour unloader and a companion ore bridge rated at 1360 tph speed ore handling for midwest steel producer. Check the coupon at right for details on Dravo bulk materials handling equipment for mills, plants or docks.



ORE PROCESSING

Over 45% of sinter capacity added by U.S. steel industry in last 5 years has been furnished by Dravo—including this 2400-ton-per-day plant. Check and mail coupon to obtain more information on sintering, briquetting, pelletizing and ore beneficiating plants.

SPECIAL CONSTRUCTION

Head frame (left foreground of photo) sits astride 575-ft. concrete-lined ventilating shaft at a steel company mine. Construction of shafts, slopes, tunnels, docks and harbors are part of Dravo's half century of experience in special construction. Mail coupon for information.

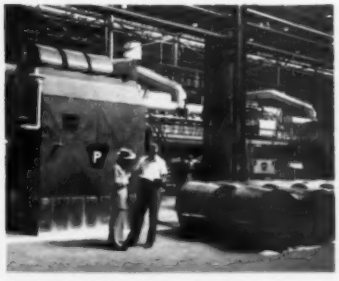
Dravo furnished ore unloader, ore bridge and sinter plant for this midwestern steel producer.

PLANT UTILITIES

When completed, this modern intake and pumping station will handle up to 30 million gallons of water daily. Such Dravo turn-key projects include oxygen, power and boiler plants, compressor stations, other special utility and plant facilities. Mail coupon for information.

SPACE HEATING

One of 60 Dravo space heaters which supply comfort heating in this large strip mill. Over 20,000 units (¼ to 3 million btu) are in use throughout industry for all types of manufacturing and warehousing structures. Check and mail coupon for details.



Dravo Corporation, 4750 Grand Avenue, Pittsburgh 25, Pa.

Please send me information on the following products and services

☐ Oxygen Steel-making	☐ Ore Bridges	☐ Docks, Harbors
☐ Oxygen Plants	☐ Towboats	☐ Water Intakes
☐ Mill Lubrication	☐ Barges	☐ Shafts, Tunnels
☐ Sinter Plants & Coolers	☐ Briquetting	☐ Space Heaters
☐ Ore Beneficiation	☐ Pelletizing	☐ Container Cranes
☐ Ore & Coal Unloaders	☐ Grating	☐ Fabricated Piping

Name _____ Title _____

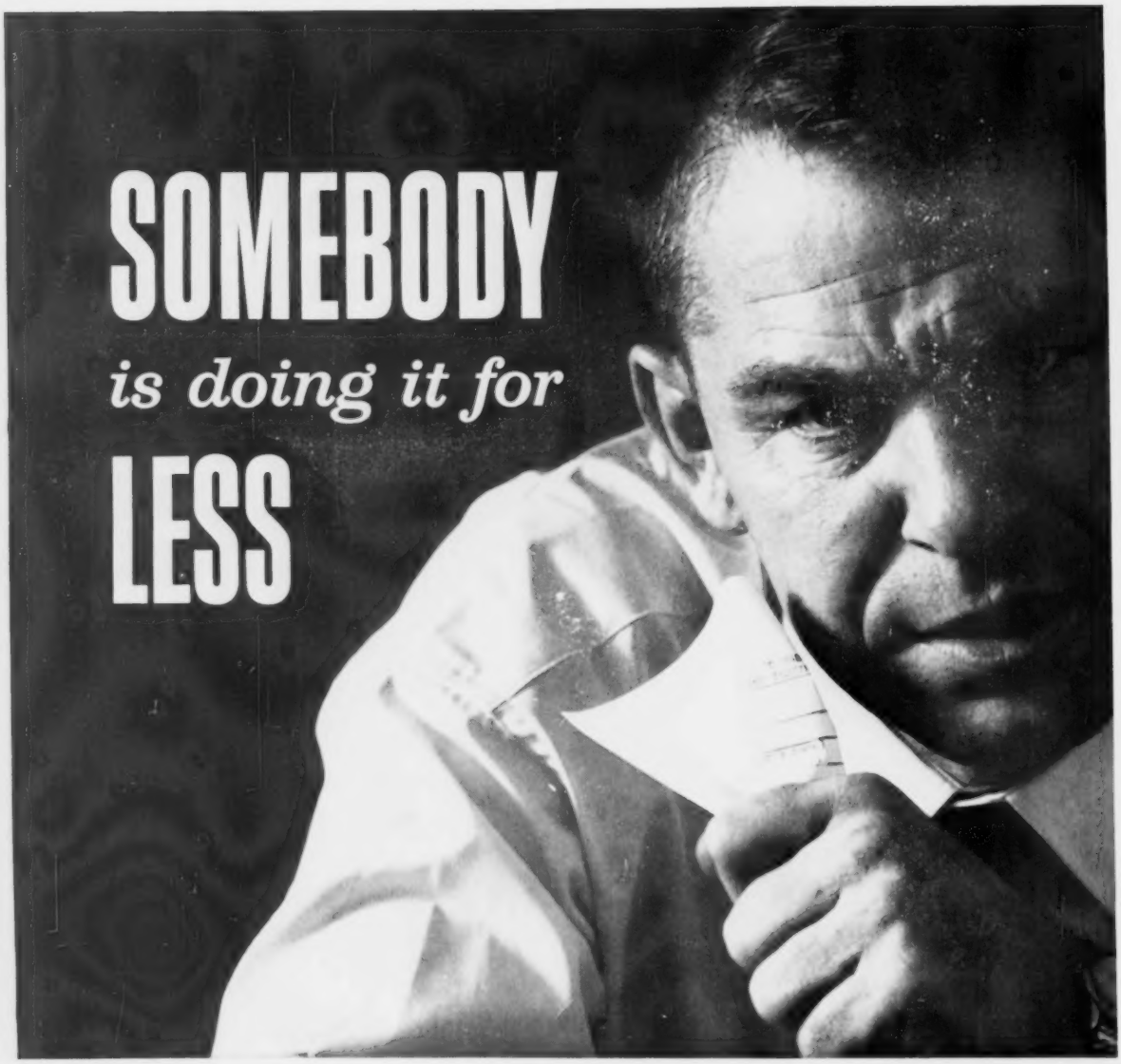
Company _____

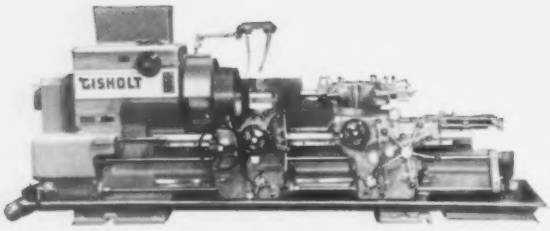
Address _____

City _____ Zone _____ State _____

DRAVO

SOMEBODY *is doing it for* LESS





MASTERLINE® 3L Saddle Type Turret Lathe—
Offers maximum operator ease: speed selector for 12 or 24 spindle speeds; separate lever controls for cross and longitudinal rapid traverse. With cross-feeding hex turret, standard tools handle all types of machining. JETracer® (for cross slide, cross-feeding hex turret, or mounted on turret face) handles tapers, contours, steps and combination forms automatically.

Call your Gisholt Representative or write for literature.

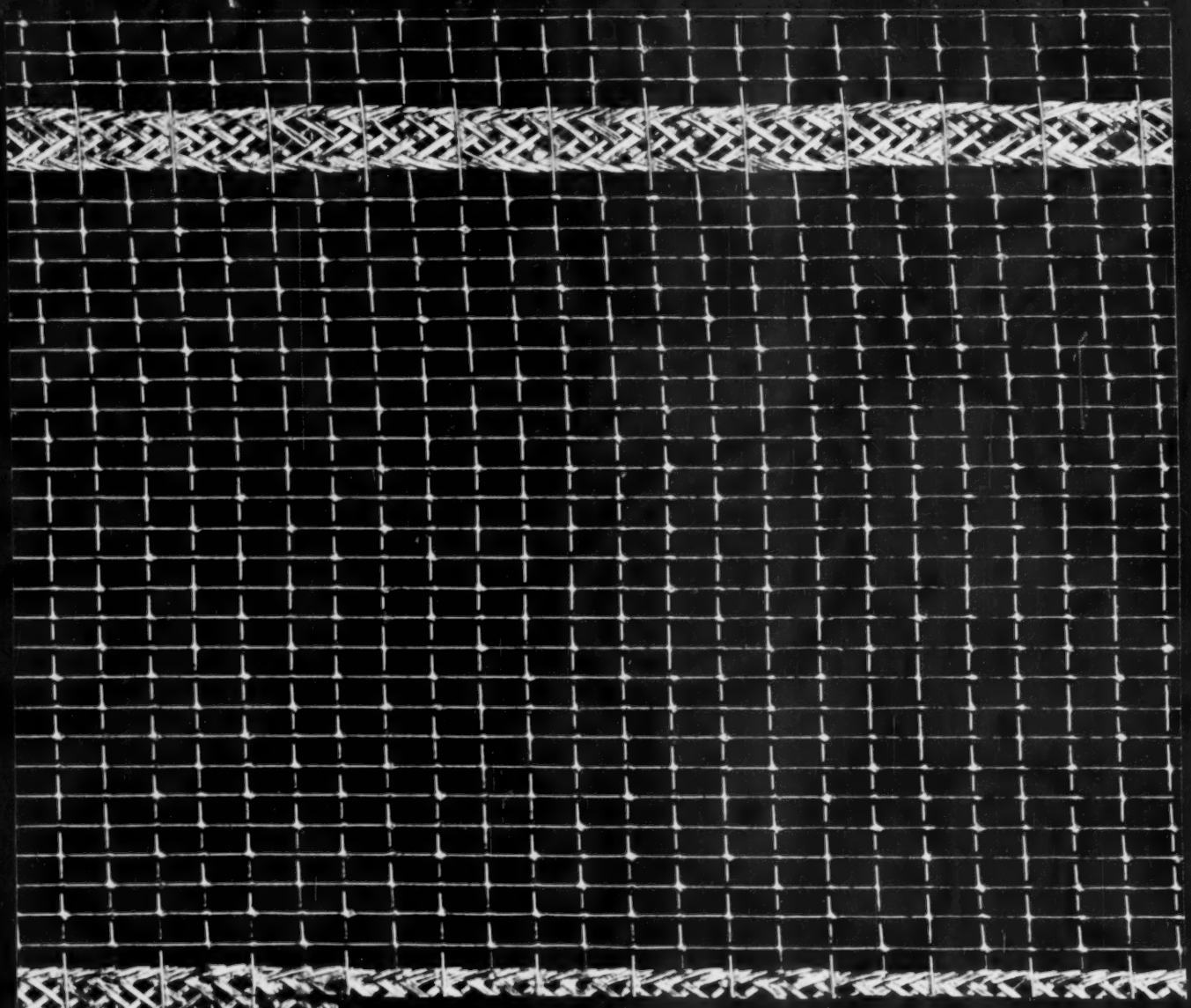
And since that somebody competes directly with you, it's time to act. With modern lathes, sooner or later he'll force your hand.

Do you realize that a new Gisholt Turret Lathe is at least 40% more efficient than a 10-year-old machine? You save time and floor space—you reduce rejects, maintenance costs, and skilled labor requirements.

Why not act now? Find out what a new Gisholt can do for you. Join those who are doing it for less.

Write for Literature.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.



NEW NS REYNOLDS WIRE CLOTH HAS FIRM BRAID EDGE

New Braid Weave* Wire Cloth from the Reynolds Division of National-Standard is woven with an integral flat braid to give it a safe, firm, workable edge. Braid Weave is available in 2-mesh to 8-mesh, hot-dip galvanized cloth, woven up to 48 inches wide. Reynolds slits Braid Weave to order for two to twelve inch widths.

To get the complete story on the variety of widths and product design advantages available from NS Braid Weave, contact National-Standard Company, Niles, Michigan. 61 W02A

*T.M.

NS NATIONAL STANDARD COMPANY

NATIONAL-STANDARD COMPANY

Niles, Michigan

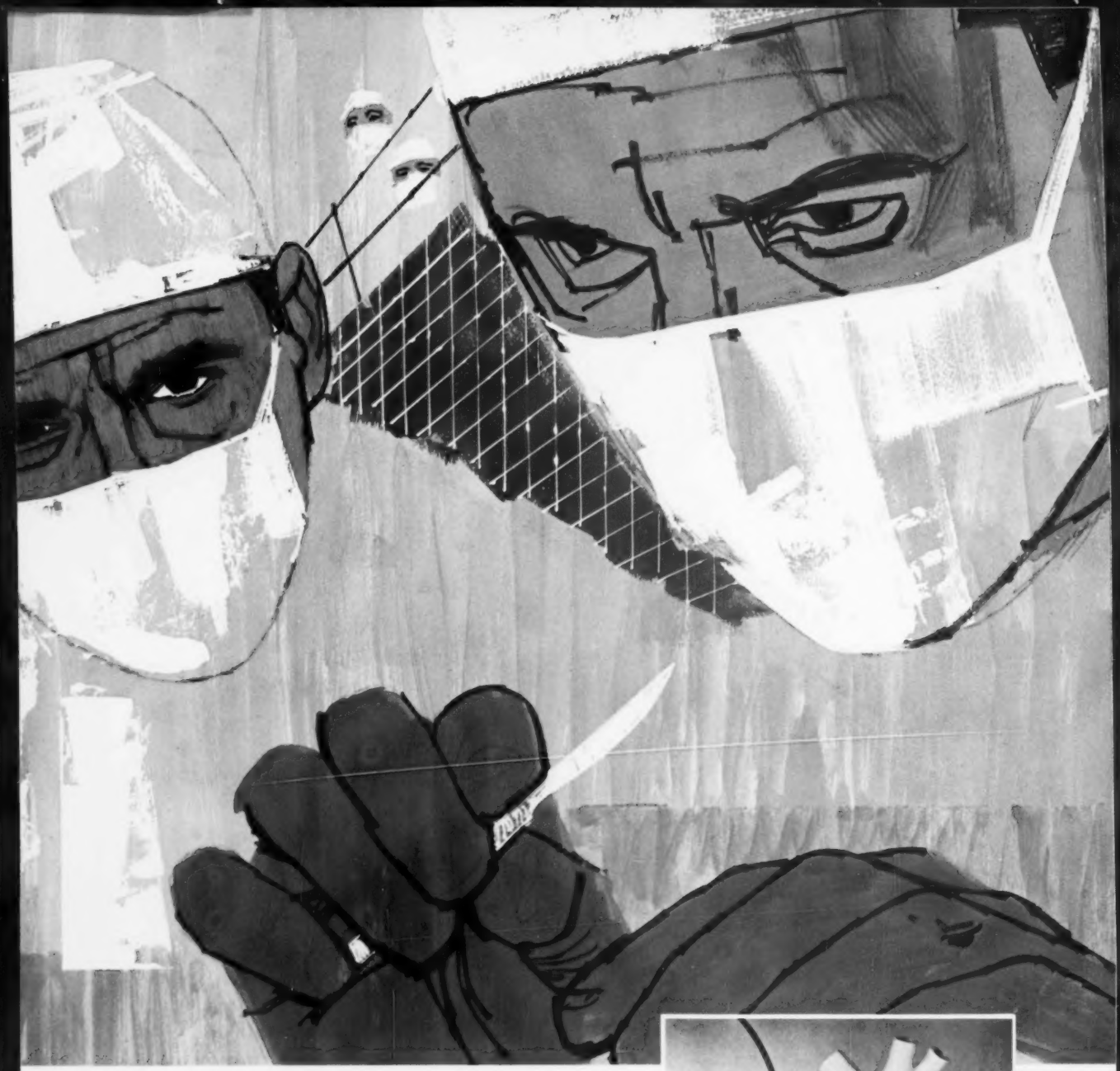
NS SPECIAL WIRE TRANSMITS

Doctors are saving more lives today in heart surgery cases through the transmission of carefully timed electrical pulses into the heart. Many patients suffering from lost heartbeat due to surgery or other causes have been restored to active life through such heart stimulation.

A LEADING MEDICAL INSTRUMENT COMPANY developed a pocket-size electronic package to generate the electrical impulse, which is transmitted to the heart through the jugular vein by a tiny stainless steel braided wire.

In their search for the right conductor to carry the electric pulses to the heart, researchers came to National-Standard for help in developing a wire flexible enough to follow the intricate path of the circulatory system, while, at the same time, soft enough to avoid damaging the blood vessels or the heart itself. In addition, the wire had to be very thin, strong enough to withstand the constant flexing of the heart, and with just the proper electrical characteristics.

NATIONAL-STANDARD ENGINEERS developed a braid of 16 wires, each .0036″ diameter, or about the thickness of human hair. Using type 302 stainless



SPARK OF LIFE

steel wire, NS engineers produced a braided wire with high tensile strength, good resistance to fracture, good conductivity and flexibility just right for the delicate application.

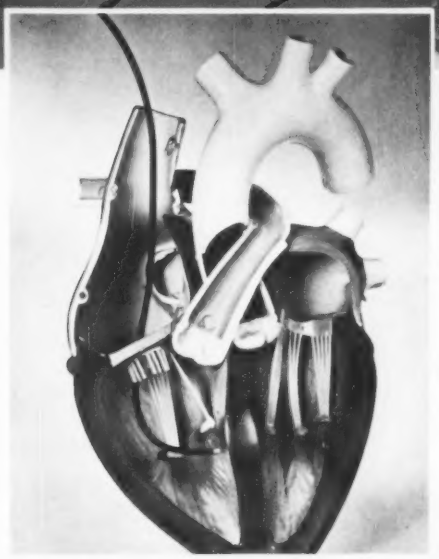
EXPERIENCED ENGINEERING HELP of this kind, for jobs requiring high-quality wire, to meet special or unique applications, is available to you from National-Standard. Write for additional information to National-Standard Company, Niles, Michigan.

NS NATIONAL STANDARD COMPANY

Manufacturer of Specialty Wire and Metal Products

NATIONAL-STANDARD COMPANY

Niles, Michigan



NS SPECIAL WIRE transmits spark of life from transistorized, battery-powered package, through jugular vein, to the heart. Carefully timed electrical pulses train tired hearts to beat normally again.

this modern

CLEVELAND PRESS

embodies every essential feature for

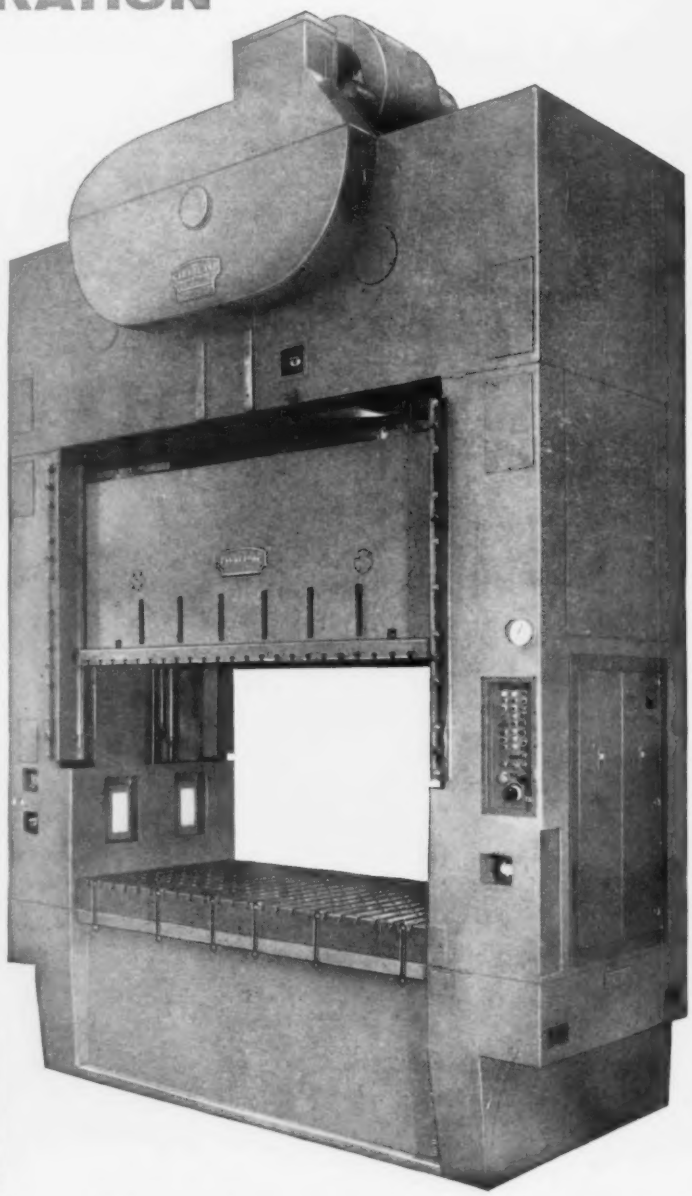
EFFICIENT OPERATION

Designed to produce many different types of stampings, this modern Cleveland Four Point Press already has proven its cost-cutting efficiency in automotive, appliance and other industrial pressrooms.

Features on this press are:

- Electrically controlled air-operated Cleveland (patented) Drum Type Clutch with spring loaded brake
- Air counterbalanced slide
- Pneumatic cushion in the bed, with controls for separate operation
- Auxiliary air brake on flywheel
- Lighted die area
- Gears completely enclosed, spray lubricated
- Stroke indicator
- Built to JIC Standards

Cleveland Four Point Presses can be furnished in a wide range of sizes, with capacities to suit particular requirements by modifying the stroke, adjustment, bed and slide areas. All models have this in common — maximum accuracy and die life . . . minimum maintenance and per-part costs . . . that's why it pays you to look into the advantages Cleveland Presses offer.



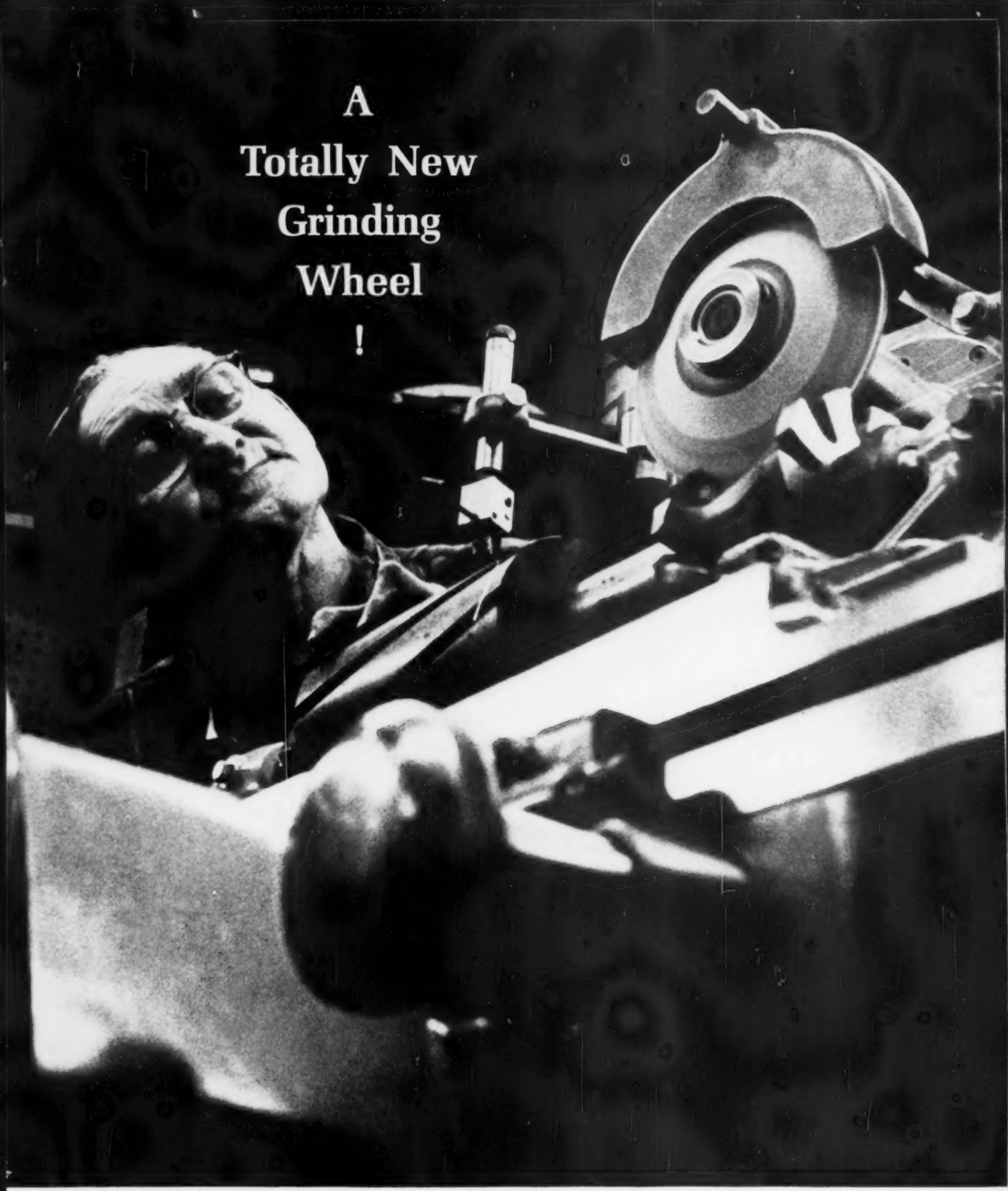
500-ton capacity, 24" stroke with 15" adjustment; shut-height 61½"; slide and bed both 72" x 144".

THE CLEVELAND PUNCH & SHEAR WORKS CO.
Established 1880

Power Presses
Fabricating Tools
Punching Tools & Dies

E. 40th and St. Clair Avenue, Cleveland 14, Ohio

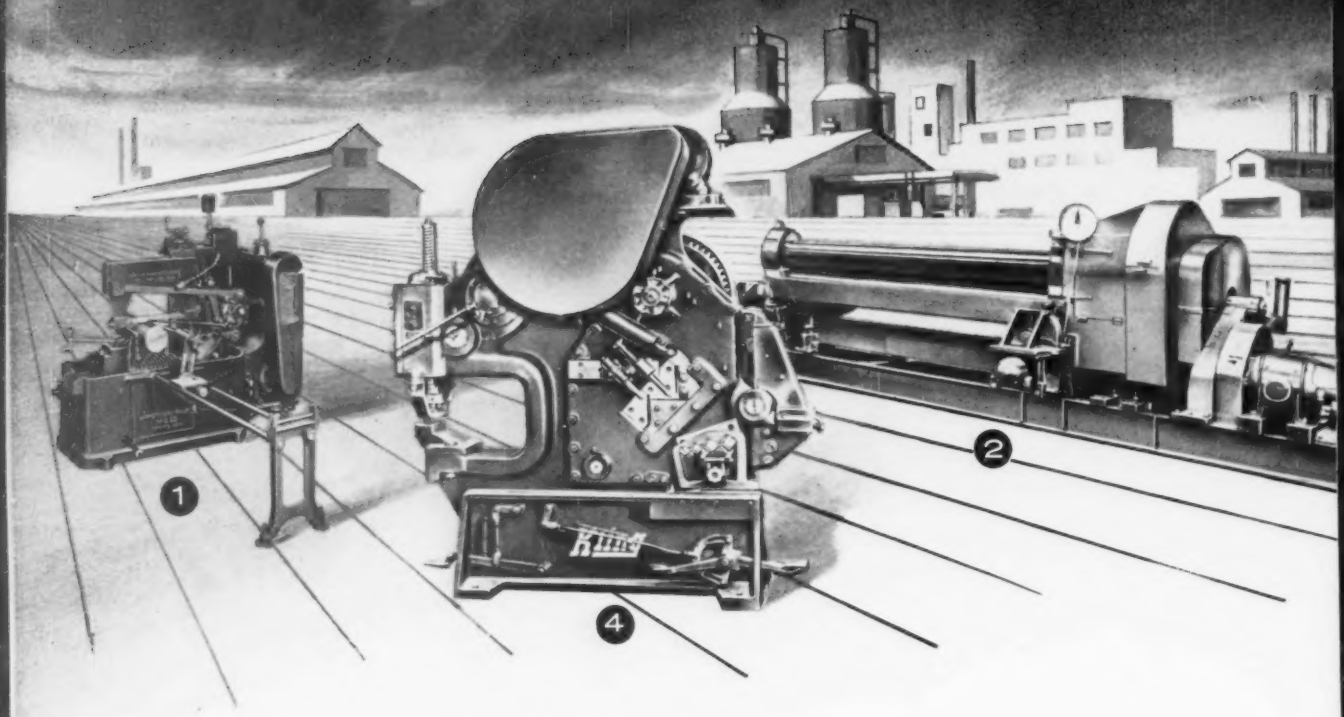
A 1516A



There is a totally new grinding wheel so genuinely good that you'll want no one but your tool room skeptic—the man *least* likely to be impressed—to make the test. Set up on one of the super-hard tool steels, or on a rugged circular-form grinding job. Together you will experience the rare pleasure of discovering something entirely new and honestly superior: a wheel with the staying power to grind farther and faster than any other you have known. The wheel to specify is Carborundum's PA-V40 (the initials PA stand for a totally new abrasive grain). To arrange an immediate test, simply call your Carborundum distributor or factory representative. **CARBORUNDUM**

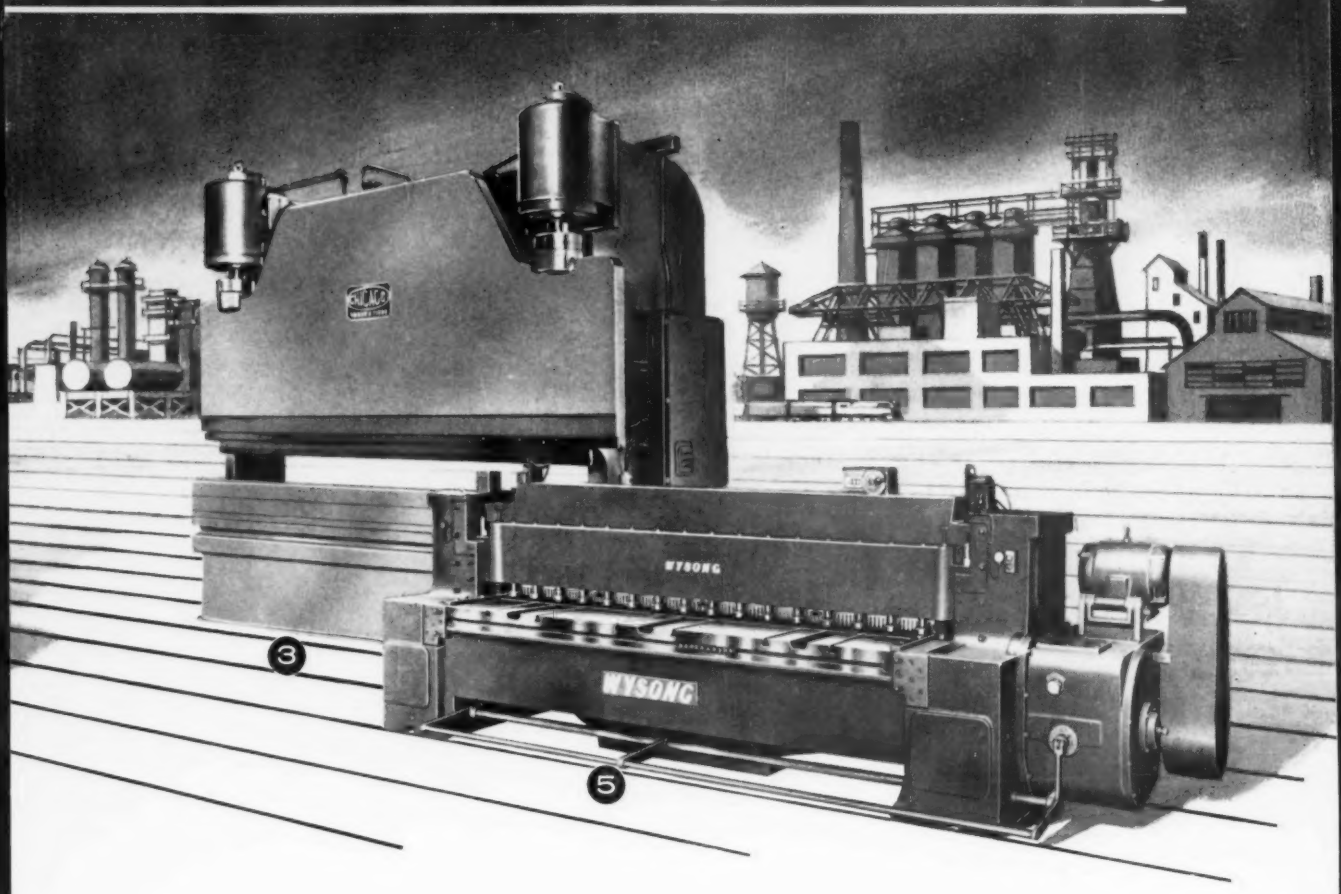
5 REASONS WHY RYERSON IS . . . .

your most complete source



1. **ARMSTRONG BLUM MFG. CO.** Full range of high-speed and general-purpose hack saws, plus regular and high-speed vertical band saws.
2. **BERTSCH & CO.** Plate bending rolls in a complete range of capacities, and overdriven squaring shears for material from 10 gauge to 1¼" thick. Also straightening rolls and culvert-making machines.
3. **DREIS & KRUMP MFG. CO.** Mechanical and hydraulic press brakes from 11- to 2000-ton capacity. Also full line of hand and power apron brakes, straight side presses, and special bending machines.
4. **KLING DIVISION, HILL ACME CO.** Famous for its combination shear-punch and coper, and for a complete line of punches, bar and angle shears, rotary shears, friction saws, bar and angle rolls, bulldozers and structural mills.
5. **WYSONG AND MILES CO.** Underdriven squaring shears for material from 18 gauge to ½" thick, also sheet metal rolls.

for metalworking machinery



No other single supplier of machinery for metal fabrication can offer you the range of types and models available from Ryerson. So, with no other supplier can you be so sure of getting exactly the right machine to do each fabricating job best at lowest cost.

We represent nearly 100 manufacturers, each a recognized leader in its field. The five featured on these pages represent five good reasons why it will pay you to call in a Ryerson representative when you're considering a machinery purchase. His recommendations are backed by Ryerson experience gained in supplying metal *and* the machinery to fabricate it for over a century.

Our complete line includes equipment for bending, braking, forming, hoisting, drilling, pressing, punching, rolling, sawing, shearing, threading and welding.

RYERSON METALOGICS

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND STEEL FAMILY

STEEL · ALUMINUM · PLASTICS · METALWORKING MACHINERY

A practical approach to quenching

The three most common media used for quenching steel are water, brine and oil. Water offers rapid cooling, good hardness, penetration and low cost but may cause quench cracks. And it rates low in uniformity and size retention. Brine is even faster than water. It removes heat more uniformly but it, too, produces distortion and quench cracks. Oil is milder. It does not remove heat as fast as water or brine, but will minimize distortion and cracking.

Generally speaking, plain carbon steels require a high cooling rate such as that of water or brine for maximum hardness. Most alloy steels require a lower quenching speed for hardening, with some high alloy steels, such as high-speed tool steel, hardening fully in air.

Thus, the determination of what quench to use depends on the steel analysis, the quenching speed the specific steel requires, and the physical properties called for in the finished part. As a guide, here are six distinct quenchants developed and produced by Houghton. They provide full coverage of the complete range of cooling speeds called for by various steel analyses and the physical properties required in the part:

1. **A high-speed oil** that quickly quenches critical alloy steels for maximum hardness.
2. **A general purpose oil** that provides adequate hardness, superior toughness and low distortion in a wide range of alloy steels.
3. **A martempering oil** which can be maintained at 350°F. for long periods. For interrupted quenching to provide toughness and close size tolerance.
4. **Molten salt** for interrupted quenching at temperatures up to 1000°F. . . . for martempering, austempering and patenting.
5. **An additive for water** to minimize quench cracks.
6. **A concentrate** for addition to tanks of 100° paraffine oil to improve stability and accelerate the quenching rate.

If you are looking for improved physicals, better heat treat uniformity or fewer rejects, you can get experienced advice from Houghton—a leader in metallurgy for more than 50 years.

COMMON-SENSE QUENCHING HINTS

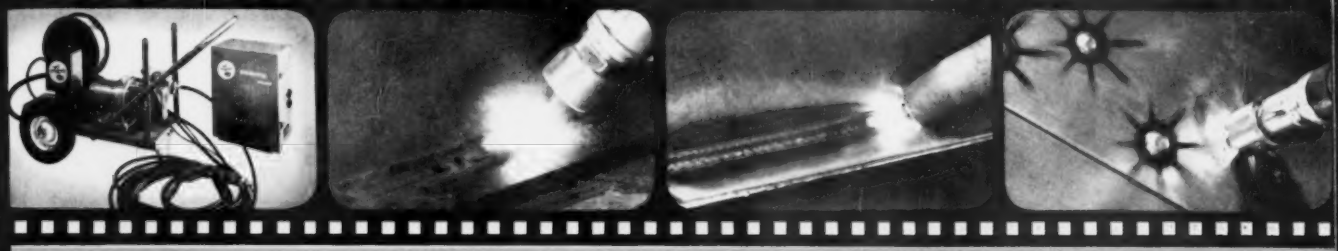
1. Provide oil circulation so that all surfaces of parts to be quenched are exposed uniformly to the oil. Containers should be baffled. Avoid nesting of work.
2. When installing cooling coils, the water in the coils should run counter-flow to the oil to provide maximum temperature differential.
3. The quench tank should be equipped with a tight cover and a CO_2 extinguisher handy in case the oil should catch fire.
4. Avoid use of baskets in quenching where possible. It is better to drop small parts on a screen which can be lifted out of the bath. Basket congestion hinders uniform cooling.
5. Avoid temperature variation when water is the quenching medium. Hold to 20° maximum spread.
6. Distortion and quench cracks can be minimized by removing the work from the quench before it reaches the temperature of the fluid.
7. It is advisable to temper **immediately** after quenching to relieve stresses and avoid quench cracks.
8. Wherever possible oil quenched work should be cleaned prior to tempering in salt to minimize salt contamination.

Your nearby Houghton representative will gladly give you detailed information and help in analyzing your problem and recommending the quench best suited to your need. Call him or write for a copy of "Houghton on Quenching". E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION

SIGMATIC



One SIGMATIC machine for... spray arc... short arc... spot welding

Spray arc, short arc, spot welding... never before combined in a single piece of equipment. SCC-8 control incorporates special spot-welding circuitry, featuring a directly-calibrated, precision weld timer and an independently-adjustable, "non-stick" timer. Converts from spot to continuous fusion welding at the flick of a switch. SEH-2 heavy-duty wire-feed unit—largest, most-rugged unit available today—permits positive feed of all "Mig" wire types, metals and diameters. The SIGMATIC line contains five basic units, designed with interchangeable parts permitting more than 50 combinations tailor-made to individual specifications. Available in cart-, sled- or bench-type units.

Unique controls are vastly simplified. All components are visible and accessible. Adjustments can be made with a screw driver. Only heavy-duty industrial-type parts are used throughout each unit to insure dependable, long-life performance with minimum maintenance. Top-quality parts—"Square D" pneumatic timers, Mallory electrolytic condensers, Cutler-Hammer switches, Potter & Brumfield relays, Electrons, Inc. thyratron tubes. The SIGMATIC line is unquestionably a major welding advance—with one rugged, durable machine, you can do any type of "Mig" welding in any position on any thickness of any metal. For more information or a live demonstration, call your nearest Linde office.

"Linde," "Sigmatic" and "Union Carbide" are registered trade marks of Union Carbide Corporation

LINDE COMPANY UNION CARBIDE

Division of Union Carbide Corporation
270 Park Avenue, New York 17, N. Y.

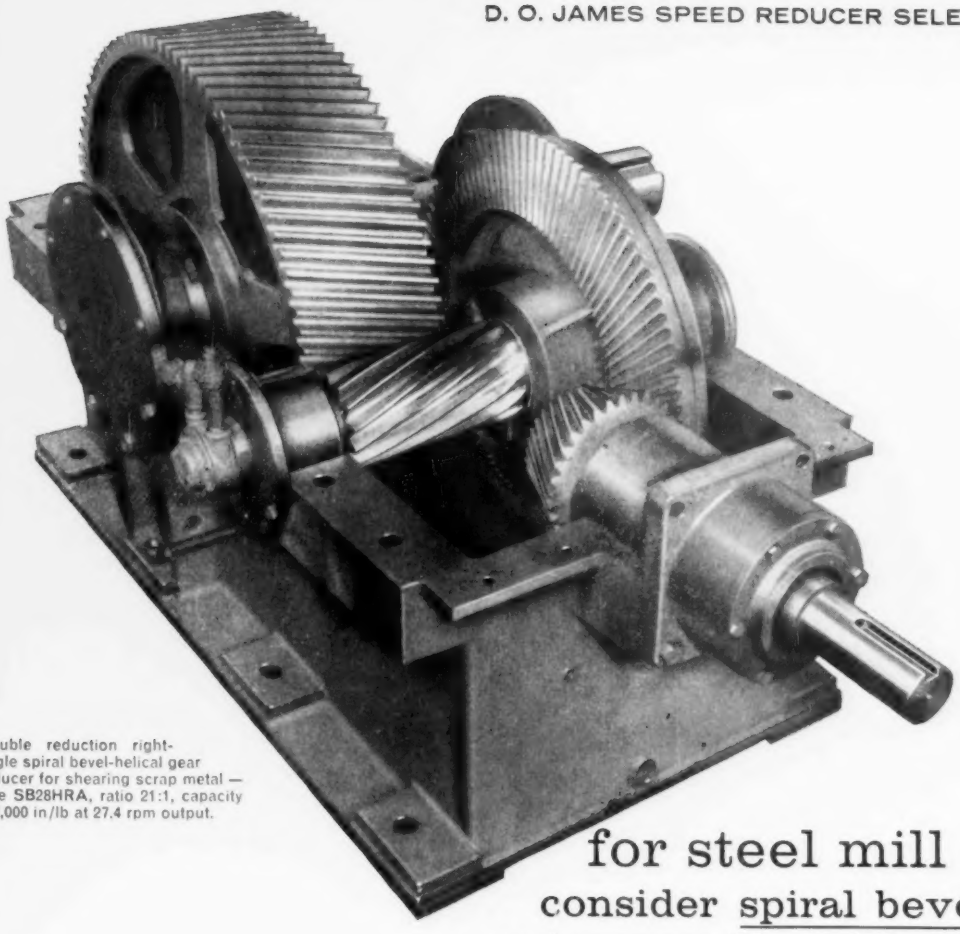
SIGMATIC

NEW ALL-IN-ONE "MIG" WELDING EQUIPMENT

Welding equipment is designed, developed and refined, but eventually it must be redesigned. LINDE'S new SIGMATIC line of "Mig" welding equipment is a product of this evolution... plus LINDE'S vast experience with more inert-gas and consumable-electrode processes than any other company in the world. The SIGMATIC line is the most-versatile semi-automatic equipment available anywhere—*one* machine for:

- **...all types of "Mig" welding—spray arc, short arc and spot welding**
- **...in all welding positions—vertical, overhead or downhand**
- **...with all shielding gases—argon, helium, CO_2, or their mixtures**
- **...and all wires—hard or soft, solid or tube**
- **...on all weldable metals—carbon steel, stainless, aluminum, magnesium, titanium**
- **...on all thicknesses—sheet metal and up**

See next page for details.

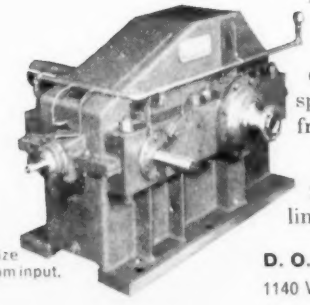


Double reduction right-angle spiral bevel-helical gear reducer for shearing scrap metal — size SB28HRA, ratio 21:1, capacity 817,000 in/lb at 27.4 rpm output.

for steel mill drives

consider spiral bevel-helical reducers with welded housings

The high efficiences of spiral bevel and helical gears are combined in these D. O. James reducers to provide an over-all efficiency in the range of 95%. Additionally, this type of gearing insures dependable operation under heavy or shock loads, high reduction ratios, and continuous operation.



Triple reduction right-angle spiral bevel-helical reducer — size 270HTRA, ratio 95:1, 30 hp at 870 rpm input.

Drives specially designed to meet your requirements are economically practical through the use of fabricated all-steel welded housings which provide great strength and deflection-free rigidity. The standard line of D. O. James spiral bevel-helical reducers includes 42 sizes with capacities from .2 to 637 hp, ratios from 6:1 to 358:1.

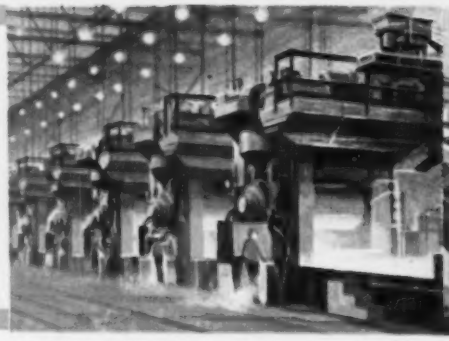
For complete data on standard or special spiral bevel-helical reducers, call your D. O. James representative or write, outlining your requirements.

D. O. JAMES GEAR MANUFACTURING CO.
1140 West Monroe Street, Chicago 7, Illinois
Since 1888, every type of gear and gear speed reducer.

D.O.James

...where you always get good gearing

FIVE MAJOR STEPS TO FURTHER PROGRESS



AT GREAT LAKES STEEL in Detroit, the computer-controlled and operated 80" Mill of the Future—fastest, most powerful hot-strip mill in the world—will provide more and better automobile body sheets.

AT MIDWEST STEEL near Chicago, the most modern and efficient steel finishing plant in existence will provide industry with the finest quality tin plate, galvanized sheets, hot- and cold-rolled sheets.

George M. Humphrey,
Thomas E. Millsop and Paul H. Carnahan,
top men at National Steel Corporation, talk about . . .

NATIONAL STEEL'S $300 MILLION OF NEW CONSTRUCTION . . .

and what it means to you

The huge program begun three years ago by National Steel is nearing completion. Costing in excess of $300 million, it is a signal of continuing progress at National Steel. It is the result of a never-ending search for the new and the better.

It is tangible evidence that private citizens have firm confidence in the future and are willing to back this confidence with huge amounts of private money. It is the kind of thing, throughout our economy, which provides the solid foundation for widespread American prosperity . . . and for which there is no substitute.

There are obvious benefits, of course, that will result from this construction program.

TO OUR EMPLOYEES—it means better, more secure, more stable jobs.

TO OUR CUSTOMERS—this expansion means the assurance of steel supply in volume during periods of peak demand. In any period, the expansion means steel of the highest and most uniform quality ever produced.

TO OUR COMPANY—it means higher efficiency, greater stability and lower costs throughout our operations . . . factors which provide us with a stronger competitive position in the market place.

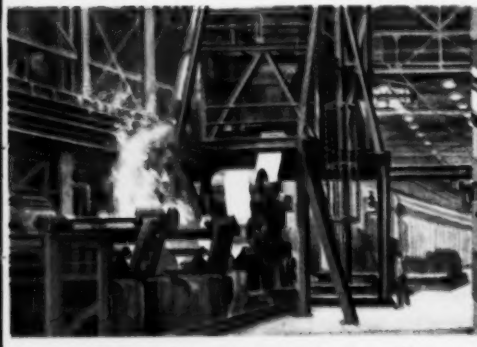
TO YOU AS A CONSUMER OF STEEL—it means better products because of better steel. It means greater value for your dollar in the products you buy.

TO YOU AS AN AMERICAN—it means a powerful weapon against inflation; it means more strength for America faced with competition against the low-cost labor and newly added modern techniques of foreign producers. And it means a greater industrial base for national security.

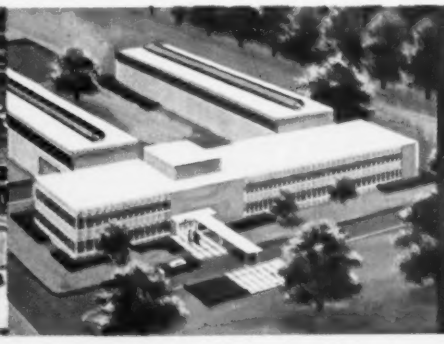
As National Steel's new facilities come into operation during the months ahead, we'll tell you more about them. And we think you'll agree that it will be good news for our employees, our customers, our company and for you.

NATIONAL STEEL CORPORATION, PITTSBURGH, PA.

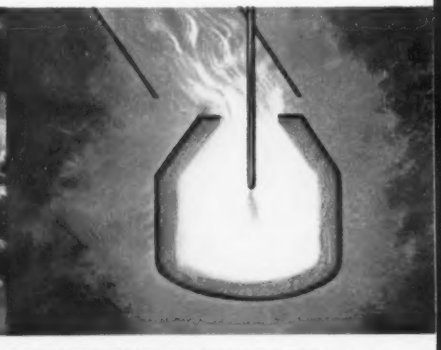
SUBSIDIARIES AND DIVISIONS:
GREAT LAKES STEEL • WEIRTON STEEL • MIDWEST STEEL • STRAN-STEEL • ENAMELSTRIP • HANNA FURNACE • NATIONAL STEEL PRODUCTS



AT WEIRTON STEEL in Weirton, W. Va., new and improved facilities throughout this division will increase the production and improve the quality of Weirton's tin plate, galvanized sheets and cold-rolled sheets.



OUR NEW RESEARCH CENTER will be National Steel's headquarters for the expanded, continuing exploration of new and better raw materials, facilities, manufacturing processes and products of steel.



A BASIC OXYGEN STEELMAKING SHOP, including two of the largest vessels ever built, is now under construction at Great Lakes Steel in Detroit to increase the flexibility and efficiency of our operations.

TERRIFIC!

— and how long will the flexing member last?

Good question. The heart of Para-flex is a tire with synthetic tension members bonded together in rubber—which provides a flexing body that automatically compensates for *all combinations* of misalignment and end float, and absorbs vibration as well!

This amazing coupling has now been used in American industry 4 years. Thousands are in operation—in steel mills, paper mills, oil fields, mines, quarries, chemical plants, everywhere—and in these 4 years, replacements of elements have been negligible.

Dodge Standard Para-flex takes angular misalignment up to 4°, parallel misalignment up to ⅛″ and end float up to 5/16″ depending upon the size of the coupling and the duration of shaft displacement.

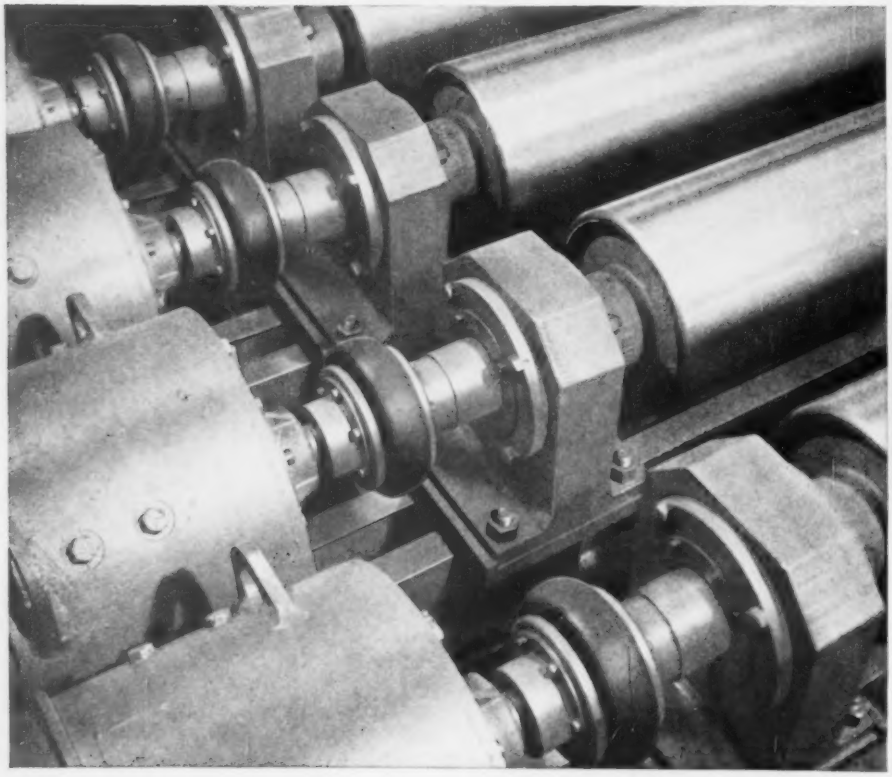
Dodge Para-flex is available in 3 types—Standard, Flywheel and High Speed (shown at right). The Standard type is stocked in capacities up to 3640 hp at 910 rpm. Ask your Dodge Distributor, or write us for complete technical bulletin.

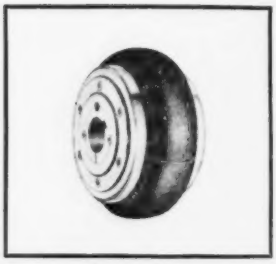
Dodge Manufacturing Corporation, 800 Union Street, Mishawaka, Indiana

The Products with the Pluses . . .

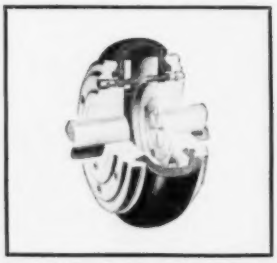
DODGE

of Mishawaka, Ind.

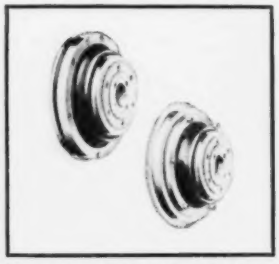




The new idea in flexible cushion couplings, with a flexing member that "swallows up" misalignment.



No lubrication, no maintenance. Replace flexing element without moving driver or driven machine.



Flywheel and High Speed Types. For use with motors and internal combustion engines turning up to 5230 rpm.

DODGE
Para•flex

CALL THE TRANSMISSIONEER, your Dodge Distributor. Look under "Dodge Transmissioneer" in the *white* pages of your phone book. Factory trained he can give you valuable assistance.

Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...

Raw Materials?

Your final decision to expand or build results from a series of important individual decisions. Raw material availability is one of them. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. In addition, KE designs and builds for the Steel industry... offers skilled experience in all types of facilities from raw material plants to finishing mills. Whatever your requirements... from Pre-Engineering analyses through plant design and construction... Kaiser Engineers brings world-wide experience and ingenuity to their solution.

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METALGRAMS

UNION CARBIDE METALS

. . . news of "Electromet" ferroalloys and metals

JUNE 1961

NEW ECONOMIES IN MAKING STAINLESS -- New oxygen-blown refined chrome allows savings three ways: (1) The alloy has a lower price due to economies in oxygen blowing ferrochrome. (2) Reduced carbon and silicon contents allow greater use of this low-cost chromium in the charge. By using more refined chrome in the charge, less chromium as low-carbon ferrochrome is needed later in the heat. (3) Less lime is needed to neutralize silica formed during decarburization. (The lower silicon content of the alloy forms less silica.) For more information, call your UCM representative or write for "Even Alloys are Oxygen Blown" in the Summer 1961 issue of UNION CARBIDE METALS REVIEW.

* * *

BAGS BOOST YIELD, CUT COSTS -- Tight control of silicon used for ladle deoxidation of open-hearth heats gives improved ingot structures. As a result, fewer rejections are obtained in the finishing mill and mill yields are improved. Bagged 50 per cent ferrosilicon provides closer control over deoxidation than loose alloys. The bags give higher and more uniform silicon recoveries. They also give better control of semi-killed ingot structures, improving the surface of plates and reducing rejections caused by over-deoxidation (pipe). One producer improved mill yield by 1.5 per cent and saved about $0.60 per ton. For more information, write for F-20,121 and F-20,128.

* * *

TOP BLOCKING PERFORMANCE FOR OPEN-HEARTHS -- Silicomanganese blocks meet the needs of today's fast-moving open-hearths. The fast-dissolving alloy reduces blocking time and allows better control of carbon content and alloy additions. Thus, you get lower alloy costs and fewer off-grade heats. Silicomanganese blocks also produce cleaner steel by reducing undesirable oxides. Mechanical and fatigue properties are therefore improved. Get facts and figures in a new 12-page booklet, F-20,166. Included are graphs showing production results.

* * *

VANADIUM...PUTS MUSCLE IN STEEL -- An important alloying element in tool steels, vanadium produces stronger, tougher tools that hold their cutting edge. Up to 5 per cent vanadium is used in high-speed tool steels to improve wear resistance and red hardness. In engineering steels, 0.10 to 0.25 per cent vanadium boosts strength and fatigue resistance. Vanadium also improves the high-temperature creep resistance of steam- and gas-turbine ferrous-base parts. For such additions, Union Carbide Metals offers ferrovanadium, vanadium oxide, and self-reducing vanadium. Contact your UCM representative for more information. Also, ask for the article, "The Elements That Surround Us: Vanadium," in the Summer 1960 issue of UNION CARBIDE METALS REVIEW.

* * *

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Metalworking Newsfront 6

THE CUT IN STAINLESS STEEL PRICES is a result of undercover price cutting that has been met by a major maker. This has the earmarks of the carbon steel price break in the mid-1930's when the entire basic price level was reduced by a major maker when "individual" deals became widespread.

A NEW MARKET FORECAST TOOL may be money flow. Market research executives from at least three metalworking industries will meet in the near future to map out a plan to correlate money flow with sales in their own industries. It offers the possibility of as much as a six-month lead indicator as to which way the metalworking economy is moving.

CONSUMER BUYING PLANS for durable goods were fewer in April than for April of last year. This is the finding of the Federal Reserve Board's quarterly survey of consumer buying intentions. In mid-April, 3.1 pct of families interviewed reported plans to buy new cars within 6 months. This compares with 3.3 pct last April. Another comparison: Household durables, now 8.8 pct compared to 9.4 pct last year.

METAL CAN SHIPMENTS rose by 3.6 pct during the first quarter compared with last year. This is reported by the Can Manufacturers Institute. Big gainer was shipments of cans for soft drinks. This line jumped 81.8 pct.

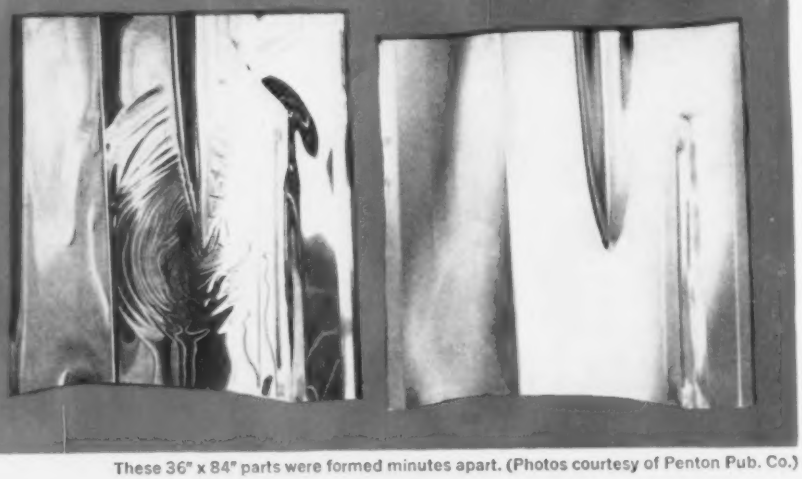
AUTO ACCESSORIES are in higher demand by compact car buyers than was anticipated. Example: About 90 pct of all Oldsmobile F-85's purchased have automatic transmissions. And one out of four F-85 buyers even demands power steering.

THE INDEX OF THE AMERICAN GEAR MANUFACTURERS ASSN. shows a volume decrease of 17.7 pct in April from March. The April index was 246.2 (1947-49=100) for new bookings. This is above the 1960 average of 235.5. The index of shipments declined in April to 233.9, down from 246.8 in March.

STEEL BUYERS are growing less interested in operating rates of the mills than they are in the fact that many finishing mills are creeping up to nearly top capacity. Products in which some finishing mills are just about at top output in scattered geographic areas include plate and hot-rolled sheet.

FANTASTIC!

production results and savings...



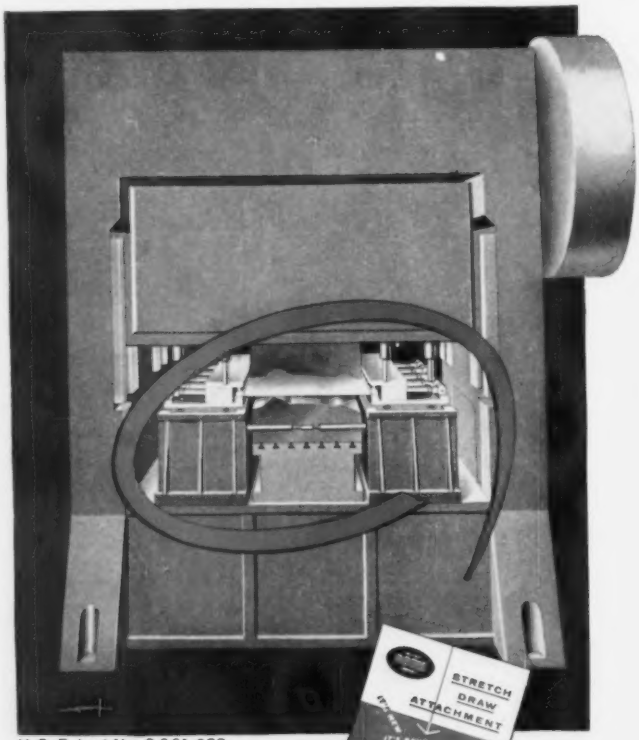
These 36" x 84" parts were formed minutes apart. (Photos courtesy of Penton Pub. Co.)

SHAPES . . . THAT HOLD THEIR SHAPES . . .

FANTASTIC is often an over used adjective, but definitely not in this case . . . Here are the facts, you be the judge!

The new BATH Tension Controlled Blank Holder can save the manufacturer of shallow draw parts over **sixty** percent in die costs and **twenty** percent in material costs . . . and the pay-off . . . deliver a better part. Stretching the metal just prior to forming makes the metal "flowable" or "plastic-like" . . . result . . . no oil canning, no wrinkles. Shallow draw parts that required a 1,000 ton press can now be produced on a 100 ton press. Part spring back is practically eliminated. If you heat treat, coat or enamel your parts, they will still hold their shape . . . in short, SHAPES THAT HOLD THEIR SHAPE.

FANTASTIC . . . it could well be just that in your future forming cost picture. Full details are available on this completely NEW process.



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Small Business Makes Big Gains; Forges Even Brighter Future

More than 300,000 "small" manufacturers make total yearly sales of nearly $50 billion.

Managed by young, smart and tough owner-executives, they keep growing in numbers and importance.

By K. W. Bennett

■ Small business is gaining ground.

Economists say the historic indicators point to an upswing in small business activity. It will be spelled out in expansions, longer workweeks, higher capital equipment expenditures.

The trend is in the making now. It will be readily apparent in the next seven months.

How small is small business?

The Size—Usually it means a company having 500 or less employees. This means that 4.5 million U. S. businesses are small business, or 95 pct of the total of all U. S. companies.

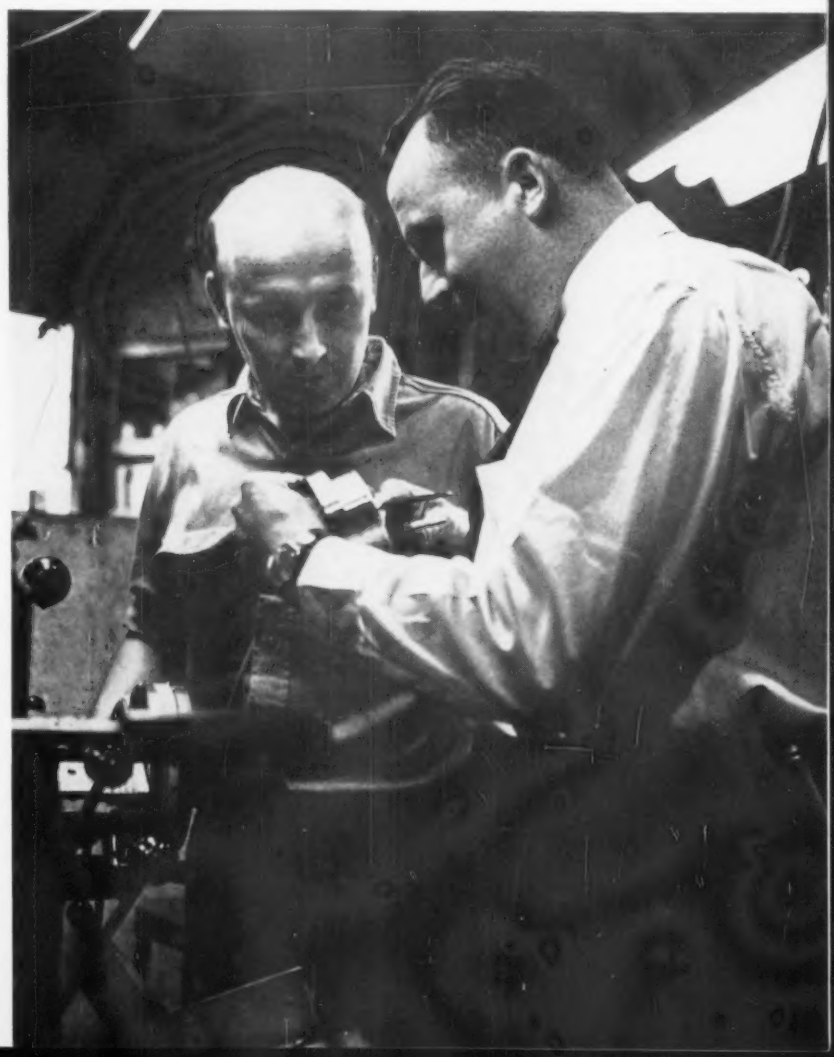
Statisticians hedge at exact figures, but as much as 40 pct of total business activity, and 30 million workers, are affected by trends in small business. In the next five years, the 4.5 million figure will go up by 10-20 pct to 5-5.5 million companies.

Loans Up—As April incorporations rose, Small Business Administration loans rose. This money, which is used for either working capital or expansion, is now moving to small business at a record April rate of 500 loans per month worth $27 million. The figure was $21 million in March, and March represented a 30 pct gain over February. Small firms borrow carefully, and only when business is looking good.

A second indicator of the turnabout: Dun & Bradstreet reports that April business failures fell. At the same time, the amount of liability in each failure also began to drop. This is the first cutback in these figures in the past four months. Economists say this is a 7-9 month lead indicator that the entire small business field is moving into an upswing.

Since small business can range from a retail drycleaner to a builder of bombsight parts, the real importance to metalworkers is in the nation's 300,000-plus small manufacturers. During 1959-60, sales by small manufacturers slipped from $46.7 billion to $45.9 billion.

The real problem, the one that



JACK-OF-ALL-TRADES: Ernest Martin is president - designer - engineer-salesman for Martin Tool Works. He came to the U. S. in 1951, started his company in 1956; now has 12-man workforce.

dried up capital goods sales to these companies was the fact that, although total sales fell only 2-3 pct, profits slipped 32-33 pct last year. Most small company managements aren't emphasizing the fact, but profits are beginning to rebound.

Numbers Grow—Despite the cutback in new business starts in early 1961, small manufacturing had already come a considerable way from the low point of 24,800 new starts in 1958. That year made the poorest showing since 1950. In 1959, 28,000 new manufacturing firms opened their doors, a 13 pct gain. Government statisticians are still totaling up the 1960 total, but will bet that new starts held at the 1959 figure—despite the poor profit picture.

And small business, despite a tough tax and profit picture, looks as though it will continue to inch up. Government planners count on a growth rate in the 1960's roughly paralleling U. S. population growth. And this despite the fact that more smaller companies disappear each year as they are acquired by larger companies. The annual rate of mergers and acquisitions by mining and manufacturing companies alone, rose 22 pct in 1955-60.

More important, it's not difficult to spot small businesses that moved sharply ahead even during the tough competitive infighting of 1960. The key to their success seems to lie in an aggressive, fairly youthful management. They are as keenly interested in new markets and new product developments as their larger competitors. The top man is most often a good engineer or manufacturing specialist, with the ability to get out and sell his product.

Cases—Case in point: E. J. Martin, head of Martin Tool Works, Franklin Park, Ill. As a high school age boy, he watched American tanks on their way to mop up German pockets of resistance push through the Black Forest town in which he lived. That was 1945. In 1951, Ernest Martin arrived in the U. S., took a tool and die making job in New York City. By 1956, he'd scraped $1000 together. With this, he bought a lathe and set it up in his garage.

With the lathe, he tackled tough, high tolerance jobs. In 1960, with 12 employees and 20 machines and a 3600 sq ft plant, he boosted sales 25 pct over the previous year, for a $200,000 gross. This year he's shooting for $250,000 and is on a seven-day week. Like many small vendors in metalworking, he has specialized in high tolerance equipment. Some of it is going into nuclear submarines.

What's his secret? "I could never work for a big company. I'd go crazy. Half the time, when I did work in bigger places, I had nothing to do."

More, he's aimed his entire plant at high speed output of high tolerance work. He's a specialist, counts on beating scheduled delivery dates for his work. He attends the metalworking shows, watches for new equipment that would better his output, is as good an "outside man" as he is in the shop. He's accumulating dollars now to buy more equipment this year to boost his capacity.

Small Start — In 1950, E. A. White borrowed $10,000 from friends. A bank had turned down his request for a loan. In 1960, at 31 years of age, his company, Bowmar Instrument Corp., at Fort Wayne, Ind., doubled capacity with a new plant addition. He started, as did Martin, in a garage. In this case, with one gear hobbing machine. He now has 450 employees and has doubled capacity five times in eight years.

PRODUCT DEVELOPMENT: J. R. Share, Litho-Strip Corp. president, developed his own methods.

A GOOD INVESTMENT: E. A. White started Bowmar Instruments Corp. when only 21 with $10,000.

Company sales were $3,344,000 in 1959, went to $5,411,000 in 1960. The company should gross $7 million this year, and hit record capital equipment purchase levels.

Why did Bowmar grow? In addition to being in the strong electronics field, Mr. White suggests: Constant reinvestment of earnings; sales built around a sales-engineer selling force; and new product development that leans heavily on reports from the field as to what customers need.

In the screw machine field, Camcraft, Inc., is another small business company that seemingly ignored the general gloom over the fate of small business. Mr. Hawley is one of 30,000 men to graduate from the small business management courses sponsored by Small Business Administration.

Camcraft employs 40 workers. Sales will hit $750,000 in the year ending June 30. With partner J. W. Hansen, who heads up the manufacturing end, Camcraft began with one $2400 screw machine in 1950. Comments Mr. Hawley, "This is a 3 pct business. If you make a dollar in this business, it's because you have techniques. You can't make money just selling a ton of iron."

CLOSE-TOLERANCE SPECIALISTS: Camcraft, Inc., partners J. W. Hansen (left) and W. A. Hawley went into business in 1950 with a $2400 screw machine, now specializes in close-tolerance work of all types.

Growth Pattern — In pursuit of higher tolerances, better techniques, the partners, both in their forties, recently purchased four more machines and already work in everything from plastics to high alloy steels. But precision is their speciality. It's worth noting that this small firm works on a five year long range marketing plan.

In coating, president J. R. Share of Litho-Strip Corp., Chicago, is a case in point. The company coats strip using some of its own processes, will hit $7.5 million in sales in 1963, up 25 pct over record 1960. In the heart of the 1960 recession, Litho - Strip was having trouble meeting customer delivery demands. Litho-Strip still qualifies as small business, though it installed a $1,250,000 strip coating line last year, is running it 24 hours per day on a five day week.

This is a company that began operations in the late 40's with $10,000 capital. President Share began working in a coating plant, then designed his own method of imprinting. He holds at least one patent. This is a small business, but it boasts its own vice president of research, 35-year-old E. M. Thornton, a chemical engineer. The company is putting in a full new lab. A part of its success, Mr. Share points out, is the gain in the market for prepainted steel and aluminum coils. He guesses the gain at tenfold in the past five years. Litho - Strip will need more capacity soon.

New Product—More can be laid to Litho-Strip's own product development. A new product, Registrip, is all ready to roll, allows for a two-color printing register on a precoated strip with major customers already waiting for the product.

Small business isn't dying. It can be extremely successful. The trends in the case histories described may be a clue. The formula, if there is one, could be:

Success Keys—1. It's the man, not the money, that will make the beginning firm a success. He's energetic, runs his own show.

2. Production line experience outweighs a college degree. The successful small business exec learns management as he goes, but knows manufacturing techniques well.

3. R&D, whether it's in new manufacturing methods or in developing new products, is as important to the small company as it is to the large manufacturer.

4. The president is out in the shop, or talking to customers, as much as he is at his desk. He's in close contact with every part of his business.

5. He's mostly a sales engineer. He knows his customers' problems, works as hard as his own engineers at solving them. Moreover, he has the background to solve them.

6. He's confident that small business is advancing, but agrees that it needs help in depreciation of tools and is outspoken on that fact.

What Stainless Price Cuts Mean

Competition Pushes Mills Into Reductions

Cuts in stainless strip base prices and some extras have rocked the industry.

Despite rising costs, competitive pressures forced mills into the reductions.

By G. J. McManus

■ Price cuts for flat-rolled products are still sending shock waves across the stainless steel industry.

On May 29, Allegheny Ludlum Steel Corp. lopped 1¢ to 4¢ off base prices for 12 grades of cold-rolled stainless strip. Size extras for strip were reduced at the same time. A new quality class, with lower prices, was installed for stainless sheets.

Discount Changes—It is also reported that a cut in distributor discounts from a former 5 pct to 2½ pct has been proposed for strip. There was no public word from any producer of such a move immediately after the base price changes. However, at least one major distributor had been notified of the allowance reduction.

In another price move last week, U.S. Steel Corp. and Republic Steel Corp. led other producers in boosting discounts on oil country goods sold to jobbers by 3 to 4 pct. This, in effect, was a reduction in mill prices to jobbers on these products. (For details, see p. 122.)

Stainless Reaction — The stainless price slashes drew reactions of dismay and surprise throughout the industry. Republic Steel Corp., Jones & Laughlin Steel Corp., Universal-Cyclops Steel Corp., and Crucible Steel Co. of America quickly said they would be competitive. Other mills indicated they would have to go along with price cuts.

However, detailed price plans were withheld as mills tried to sort out full implications several days after the changes were initiated. Any revision of distributor allowances "will be a long time shaking out," said one sales official.

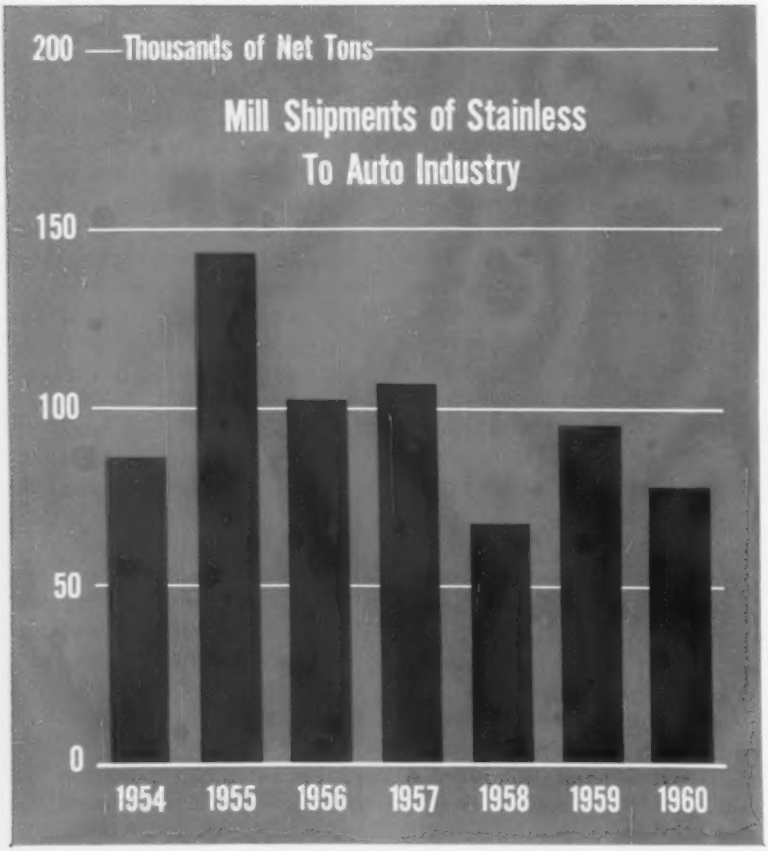
Most producers seemed surprised by the scope and timing of Allegheny Ludlum's move. There have been scattered cuts in recent months but nothing this big. Cold-rolled strip accounts for about one-third of all stainless shipments. Much goes to auto makers.

Exploded Hopes—The mills acknowledge there has been general price weakness. At the same time, they point out labor costs have been rising steadily. There have been no increases in stainless prices since 1957. With another cost hike due and with business improving, there were hopes mill prices might move up or at least show more firmness.

Allegheny Ludlum's price statement indicates how far these hopes are from realization. The company said price reductions were made "to meet competitive conditions which have recently become widespread in the flat-rolled stainless industry."

Warehouse Competition — The nature of this competition has not been spelled out, but it appears changes were aimed at distributors

Autos Are Big Stainless Market



to some extent. Stainless strip has always been primarily a mill item. Auto plants take about 40 pct of the total. Strip is ordered in large quantities and produced to special requirements.

Until fairly recently, warehouses accounted for only about 5 pct of strip shipments. In 1956, this share jumped to 10 pct and by last year, it was up to nearly 20 pct.

In addition, warehouses have gained some strip business by slitting sheets into widths under 24 in. Mill price schedules favored this practice by having identical base prices for sheet and strip in many grades while having larger width extras for the latter.

For a typical thickness, the net price of 430 strip was 46¢ in the 18-24 in. width range. As coiled sheet 24 to 36 in. across, the same material cost 44.5¢ a pound. With base prices now reduced and with size extras for wide widths down, the strip has a net price of 42.5¢. The sheet price is unchanged. Under the new economies, a slitter would be cutting a more expensive product into a less expensive one.

There was speculation, initially, that aluminum competition might have brought on the price cuts. However, one aluminum man says the auto industry has already committed itself on the trim to be used on 1962 models. And Aluminum Co. of America says it has no plans for price moves in response to the stainless changes.

These facts, along with Allegheny Ludlum's statement, point to competition within the stainless industry as the immediate cause of price action.

Discount Reduction?—The move to reduce distributor discounts, if it is actually tried, would fit the same pattern of limiting the margin available for price competition. The present 5 pct discount for stainless strip is relatively low; most stainless products have a 10 pct allowance. The proposed figure of 2.5 pct would further discourage competition.

However, stainless men question whether any reduction will stick.

U.S. Asks: Is Steel Price Rise Needed?

Even before steelmakers move to raise prices, the government studies whether price increases are "justified."

Investigation by the Council of Economic Advisers should reach the President before fall. By R. W. Crosby

■ President Kennedy's economic advisers are making a study of steel prices to determine if industry price increases are justified.

Staff members of The Council of Economic Advisers told The IRON AGE:

"We're going to see what we can learn about justification for steel price increases which steelmakers claim they need."

Industry Inspired? — The industry, itself, can take the credit or blame, depending on the outcome, for this new investigation of prices. The study was set in motion by outright statements and persistent rumors from industry sources that rising costs require a price hike.

The Administration economists, led by Council Chairman Walter Heller, say they are going to take an unprejudiced look at the industry's claims.

However, unless the present pattern is switched, the council will lean toward evidence that will not justify a steel industry price increase.

President's Interest — Ever since his election, President Kennedy has called price stability an economic necessity. As recently as his latest message to Congress, the President warned against "unjustified price increases." He said industry must pursue responsible policies in this direction.

Though staff members working on the study say the President, himself, did not single out steel, they point out: "The President has continually informed us of his general interest in wage and price increases."

Then, too, the council staff will rely somewhat on information gathered by Sen. Estes Kefauver's Antitrust and Monopoly Subcommittee. And the "administered price" information gathered by the committee is not predisposed toward justification of a price increase.

Word From Hodges — Another warning to steelmakers not to raise prices came from another Administration source last week. Commerce Secretary Luther Hodges, commenting on a rumored fall steel price hike, said:

"I do not think any price increase would be received very well publicly or in the business community."

The outcome of the study by the Council of Economic Advisers could easily be administrative pressure on the industry to stave off a price rise. If the Council finds a price increase "unjustified," the President can publicly brand it a menace to the nation's economy.

This type of moral suasion has been part of a buildup against price increases ever since the Democrats wrote into their presidential campaign platform a call for "restraint" of the so-called "administered price" industries (IA—Aug. 25, '60, p. 51).

How Far — Just how far the Council will go in studying steel prices is not yet determined. "Right now," Council staffers say, "it is not a full-scale investigation." The depth of the study will be determined by what is uncovered.

The study is sure to be in the President's hands by fall, the date rumored set for steel price increases.

Report From West Germany

Industrial Expansion, Exports Stretch Out Tool Backlogs

New orders for West German machine tools are now running ahead of shipments.

Deliveries are out to 20 months. But some see clouds on the horizon.

By E. C. Beaudet

■ Machinery builders in West Germany are riding the crest of the country's economic boom.

Not since Korea has employment in the industry been so high. Shipments last year ran 18 pct ahead of 1959. New orders, with a gain of 35 pct, did even better. And present order backlogs guarantee full employment throughout the industry for the next 15 months.

The machinery industry of West Germany has been building to its current peak for the past two and a half years. But unlike the postwar recovery years of the early 1950's, it comes less from a need to rebuild bombed out industrial capacity and more from the demands of a growing economy.

Investments Up—To keep up with the economy, the labor shortage and export demand, West German industry is pouring money into new plants and equipment at a 15 pct higher rate than last year.

As part of the machinery industry, West German machine tool builders are far from the least of those sharing in the present prosperity.

Order backlogs of the better West German machine tool companies are now running from 18 to 20 months. In fact, one builder of elephant tools can point to orders which carry through mid-1963.

Rather than wait out these long deliveries, many West German manufacturers are ordering machine tools from the United States.

A look at the chart on this page pretty well shows the trend in West German machine tool markets. Shipments of West German machine tool builders have increased from 1.8 billion Deutsche Marks in 1958 to 2.3 billion in 1960 (one D-Mark—four U. S. dollars).

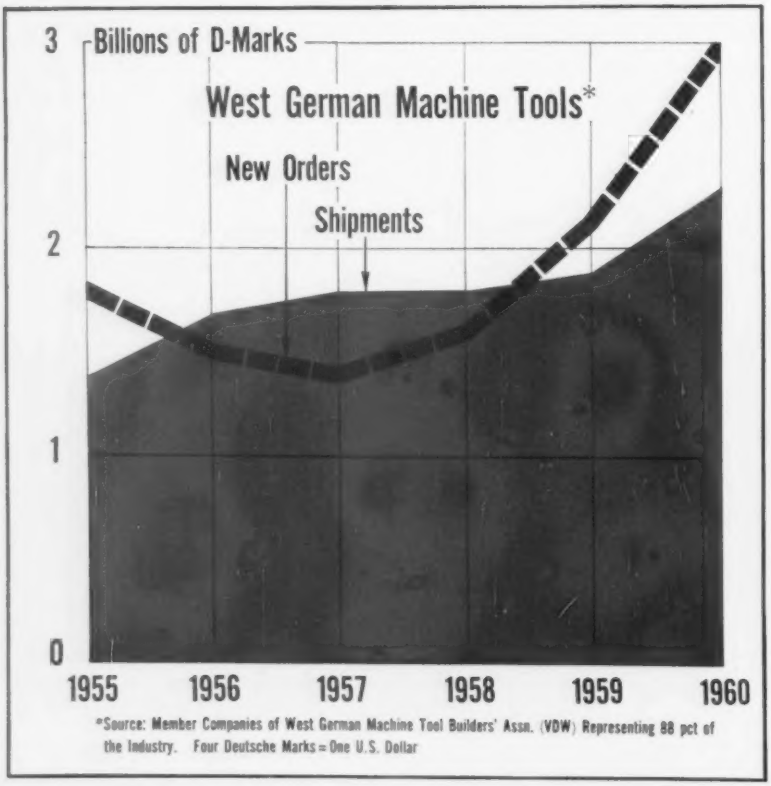
New Orders—Even more significant is the volume of new orders. From 1.6 billion in 1958 the 3 billion D-Marks rung up last year show the industry is unable to keep up with them.

Another sign of prosperity in West Germany's machine tool industry is the spurt in the number of production workers it employs. After holding at 86,000 for 1958 and 1959, the industry added 9,000 more to its payroll last year.

At the moment neither the revaluation of the D-Mark or the reduction last year in depreciation rates have had much of a dampening effect on the industry's sales.

Exports—The industry's export markets are holding up well and

New Orders Outstrip Shipments



*Source: Member Companies of West German Machine Tool Builders' Assn. (VDW) Representing 88 pct of the Industry. Four Deutsche Marks = One U.S. Dollar

BUILDUP: Machining capacity like that at Kugelfisher, Georg Schaefer & Co. has been rebuilt almost entirely since World War II.

BACKLOGS: With press deliveries far out, U. S. makes have sold well in W. Germany. This German press line is at Adam Opel.

last year accounted for 40 to 50 pct of its total shipments.

As might be expected, the biggest foreign buyers of West German machine tools are the Common Market and Outer Seven countries. Each group bought about 25 pct of total exports.

By nations, France is the largest buyer of West German machine tools with 10 pct or more of all exports in 1960. The United States and Brazil accounted for 5 pct; Argentina and India, 3 pct; and East Germany and Soviet Bloc countries another 3 to 4 pct.

Despite the higher prices, some West German manufacturers are ordering machine tools from the United States rather than wait out the long deliveries.

Buy American—Both these reasons resulted in 120 million D-Marks worth of American machine tools being imported by West Germany last year. Of all West German machine tool imports, the U.S. accounted for 40 pct. Making up the total were 22 million D-Marks worth of gear making equipment; grinding machines, 19 million D-M; press lines, 18 million D-M; and another 12.5 million D-M for automatic bar machines.

As the backlogs of West German tool builders are worked down, however, U.S. exports to the country cannot hold at this level. And there is a possibility that the situation could reverse itself if West Germany's machine tool builders ran into tough sledding.

Outlook—Looking ahead to less palmy days, West German machine tool builders can see a few clouds on their export horizon.

For one thing, labor costs in the industry are rising. And they see the time when price factors will not be as much on their side in competing for world markets.

More immediate might be a delayed effect of the D-Mark revaluation. While it has caused little trouble so far, some companies do report that currency clauses in contracts with foreign countries are being used more frequently. And some machinery companies are now renegotiating some contracts.

New Challengers—More in the future, but equally foreboding, is the growing strength of machine tool industries in other lands. At one time, the United States, Germany and England were considered the leading machine tool builders of the world.

They still are. But now both Italy and France are coming on strong. And not to be ignored in the battle for world markets is the machine tool capacity build up of the Soviet Union and East Bloc nations.

NEXT WEEK

Growth Rate Slows For W. German Steel

Steel capacity in West Germany has seen a steady build-up. But the growth rate is slowing down. Next week's report covers the outlook for present markets and future expansion.

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Electric Truck Makes Headway

But Public Acceptance Is Still the Question

Cleveland Electric Vehicle Co. has unleashed a major sales campaign for its electric multistop delivery truck.

It feels the truck is ready for the big time. What the public thinks is the real question.
By B. F. Surer

■ The electric vehicle has been on the brink of modern mass production several times in recent years. But it's never quite made it.

Now there's the possibility that multistop electric delivery trucks will lead the way.

At least one manufacturer, Cleveland Electric Vehicle Co., Cleveland, has unleashed a full-scale sales campaign to gain acceptance for the multistop electric delivery truck. CEV is an affiliate of Electric Storage Battery Co.

Its pitch: Electric trucks have been thoroughly researched and tested and "can now do the job." Also, the company says, "it can do the job more economically."

Big Market—Cleveland Vehicle is hoping to eventually gain a goodly portion of the sizeable multistop truck market. The market for new trucks with "milk-and-bread" type runs totaled 42,073 units in 1960. In 1953, 19,000 of these trucks were sold.

The company also feels there is a wide market in military use, post office work, and for intra-company operations.

M. G. Smith, vice president, industrial division, ESB, says: "We started on the electric truck about five years ago, feeling it was a market which was tremendous in scope. And with modern developments, we felt it would pay to tap it from the ground up.

". . . We have trucks being tested in every section of the United States, in various fields of activity. They are engineered to be electric trucks. We stress that they should be used in certain fields of activity; they are not for heavy applications.

Economical Operation—"In start and stop, city delivery type of service, there is no question of the economy in the operation.

"We feel there is a big potential market. At least 20,000 to 25,000 of these type delivery trucks could be battery-powered each year. It's a question of selling the public that they can save money."

Mr. Smith notes that CEV trucks now in operation have a top speed of 30 mph, can carry loads up to 5000 lb, and have a daily range of 50 miles.

Though Cleveland Vehicle estimates the initial purchase price of the electric truck will be $5000 more than the gasoline-powered vehicles, it says savings of more than $3 per day per truck are possible (see table).

Light Bodies—A big feature too, notes the company, is the lightweight construction of the electric truck body. Contrary to earlier attempts by producers of electric trucks, Cleveland Vehicle now designs and builds its own bodies. Unitized tubular steel construction is used. Panels, roofs and floor pans are made from die-formed Fiberglas.

CEV engineers also use Urethane for added strength and insulation. And a translucent roof has been placed over the driver's compartment.

But electric trucks still face hurdles before gaining public acceptance. "Buyers are naturally skepti-

ON THE JOB: An electric multistop truck, built by Cleveland Electric Vehicle Co., is being used in tests by the Borden Co. in Akron, O. The tests are being made on actual milk runs. CEV is aiming at a major market.

cal," says Morrison McMullan, Jr., vice president, CEV. "He told The IRON AGE that "many companies are now buying one of our trucks outright to conduct their own tests. Even then, some divisions of the company refuse to believe the results of the tests by another division. They insist on running their own tests.

"Fleet sales won't come until these tests have finally convinced the buyers that the new electric truck is just as satisfactory, and much cheaper to operate."

Not New—Actually, use of the electric truck for city deliveries is not new. More than 30,000 such vehicles are in use in England for delivery of milk, bread, laundry and sacked coal. There are nearly 200 electric trucks operating in this country.

But it has still taken CEV nearly five years of intensive research to come up with the electric truck it feels has a chance of capturing a major part of the multistop vehicle market.

However, this potential market in the U. S. also faces foreign competition. Smith's Delivery Vehicles, Ltd. of England has made inroads in the European and Canadian markets with its electric "Commuter."

Now it is concentrating on the American market. Smith's NCB electric truck was introduced at the British Exhibition in New York last year.

Auto Gains — An interesting point: If the electric truck gains public acceptance, it could open the door to the electric car—a vehicle that has been struggling for acceptance for more than 40 years.

The electric car has been making comeback attempts for a decade (IA —March 5, '59, p. 53). Though small gains have been made, it has never been able to crash through the barrier of public opinion. Now, however, with gasoline taxes climbing and the electric truck on the brink of a real success, there is a chance the battery-powered auto will make bigger strides.

Pleas for Tool Plan Get Mixed Reaction

Leading Administration officials sought industry support for "incentive credits" at the spring meeting of NMTBA.

But the tool builders aren't sure the program will help.
By R. H. Eshelman

■ Passage of the Kennedy Administration proposal for "incentive credits" and other specific inducements to foster machinery modernization was predicted at the spring meeting of the National Machine Tool Builders Assn.

Director of the Office of Civil and Defense Mobilization Frank Ellis made this prophesy amid echoing pleas from several members of the Administration for the support of the builders.

Mixed Reaction—The inventive credit proposal was greeted with mixed reactions by industry executives.

Association president Everett M. Hicks declared: "We are gratified to find this awareness in the Administration of the crucial problem of obsolescence in American industry. In our opinion, our current state of obsolescence is, to a large extent, attributable to our archaic depreciation policies.

"We promise to continue our support for these programs," he added, "yet there is a question in my mind whether this may be another case of too little, too late."

Lost Advantage—Mr. Hicks explained that the greatest demands for machine tools and other capital equipment comes when the economy of the country is on the upswing and there is general confidence in the future.

He then warned against big spending programs that could mean a revival of inflationary pressure—bringing higher rather than the lower costs needed for competition.

Hickman Price of the Dept. of Commerce called for support of the Administration program, asserting that "lost for our generation is the great industrial advantage the U. S. has held." He then looked ahead to call for a "massive dose" of modernization for industry.

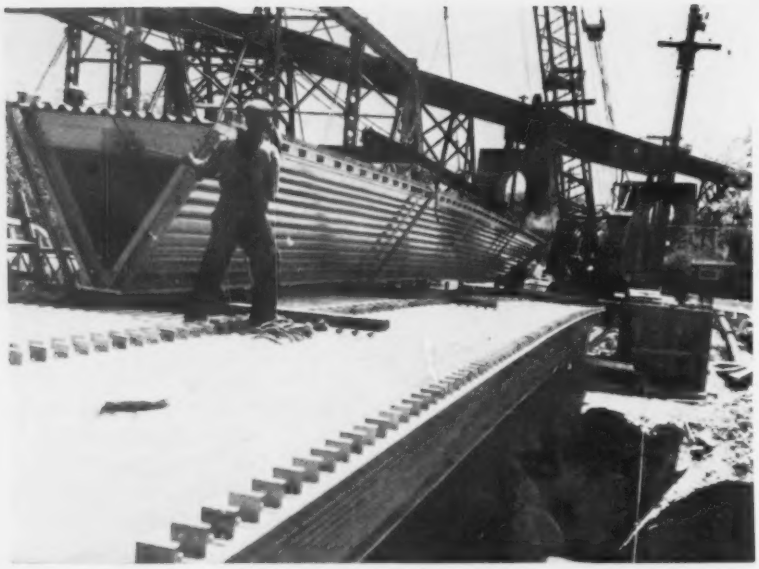
"Marshall Plan"—He proposed a form of loan or credit insurance to the middle manufacturers (too small to be big, too big to get Small Business Administration aid). In effect, this would be a "Marshall Plan" for manufacturing.

There was a blunt warning from several speakers that the machine tool industry as well as many other areas face vast and immediate competition from the Soviet block. Product research and design were cited as the only answers to overcome this.

Air Dollars—One bright aspect in the picture is the continuing capital program of the Air Force. As explained by Joseph S. Imirie, Asst. Secretary of the Air Force for Materiel, this is more of a qualitative than a quantitative effort.

But it is a substantial program in dollars—committing two to five pct of the acquisition cost of machine tools in departmental inventory per year. This amounts to $25 million in the current fiscal year, is expected to equal or exceed it for the year beginning in July.

Mr. Imirie suggests that industry could well follow this type of long-range analysis of needs and commitment. He implies that such initiative might be expected of the new Administration and that the machine tool industry could then anticipate a more stable demand and a far better era ahead.



ANOTHER FIRST: The aluminum industry's first commercial highway bridge is now under construction across the Appomattox River in Virginia.

New Aluminum Use

The aluminum industry has finally come up with a highway bridge that it says is competitive with steel in price.

The first bridge is being constructed across the Appomattox River in Virginia.

■ After years of trial-and-error, the aluminum industry has its first highway bridge which, it says, is competitive with steel in initial cost.

It's now being constructed to replace a steel bridge across the Appomattox River between Petersburg and Ettrick, Va. Completion is scheduled for August.

The bridge was designed by Reynolds Metals Co.

Competitive Price—W. G. Reynolds, executive vice president for research, says, "This bridge has been under development for several years, and is a direct outgrowth of industry studies begun in 1957. The design makes the price competitive with any highway bridge where beam depth is not a limiting factor."

Mr. Reynolds is obviously thinking of steel as the main competition. And his qualification refers to the much deeper beam needed for aluminum strength.

What is the potential for aluminum in highway bridges?

"Bridges offer aluminum one of its biggest future potentials," says Kenneth Boedecker, Reynolds market manager. "Its tonnage ranks along side that in automotive, shipbuilding and building industries." Aluminum is aiming for highway bridges over 85-ft long.

Lars Bergenhem, development director of Reynolds' bridge projects, reports 48,000 lb of aluminum will go into the two-lane, 28-ft wide, 97-ft long bridge. This, he says, is one-third the weight of the metal in a comparable steel bridge.

Less Cranes—"This weight difference is important in construction," explains Mr. Bergenhem. "The heaviest aluminum components are well within the load limits single crane."

U. S. Exports To Soviet Bloc Rise

U. S. exports to the Soviet bloc in Europe rose to $193 million last year. Red imports to this country remained virtually the same as in 1959 with a total value of $80.9 million.

Nevertheless, the Soviet countries accounted for less than one pct of the total U. S. exports in 1960.

Machinery, iron and steel products, transport equipment and parts were responsible for one-fifth of the U. S. exports to the Reds. The major share of the goods coming from the Soviets were agricultural in origin.

Chief nation among the Communists, as far as U. S. trade is concerned, was Poland.

New Steel Mill

A $62.3 million credit has been authorized by the Export-Import Bank of Washington for the Republic of the Philippines. The loan will be used to aid in the construction of the island's first integrated steel mill.

Total cost of the new steel plant is expected to exceed $116 million. Annual production should reach 230,000 tons of finished products.

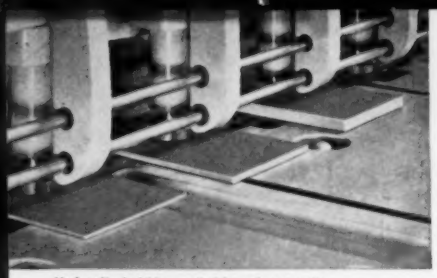
Law To Spur Boxcar Buying Urged by ICC

Legislation designed to spur purchase of more boxcars by the nation's railroads is being discussed in Congress. Hearings on the proposal begin next Tuesday.

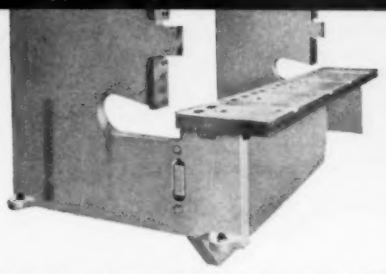
The legislation ultimately would put the rental charge for use of boxcars high enough that railroads would find it more economical to buy their own cars.

The Interstate Commerce Commission, which has asked for authority to increase the freight car supply through rate changes, would determine the rental charges.

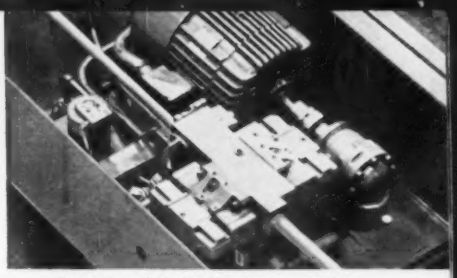
Similar legislation passed the Senate Commerce Committee last year but failed to get further action. The nation's railroads are split on support of the bill.



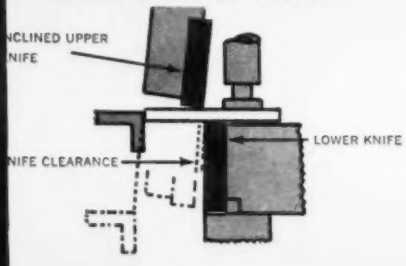
Hydraulic holddowns hold work securely.



Interlocked construction eliminates load supporting welds.

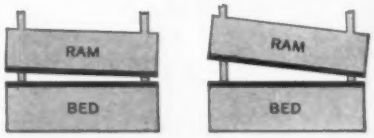


Compact manifold block replaces usual piping.



Inclined ram makes use of four edge knives practical.

Centralized controls improve operator's productivity.



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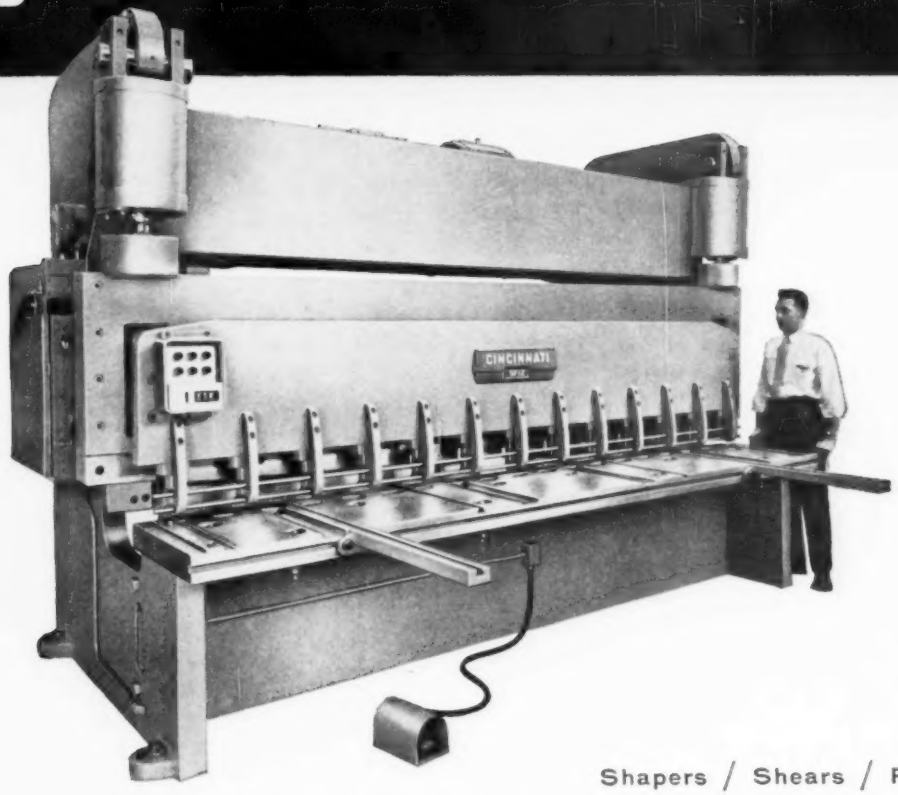
CINCINNATI® hydraulic shears



Cincinnati Hydraulic Shears include in the standard price many features which cost extra on competitive shears. Several of these are shown above. Combined with an exceptional range of shearing capacity in one frame, they make any Cincinnati Hydraulic Shear a profitable investment. Request Bulletin HS-1 for complete details and features.

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INDUSTRIAL BRIEFS

Precise Change—National Tool & Die Manufacturers Assn. has become the National Tool, Die & Precision Machining Assn. Headquarters remains at 907 Public Square Bldg., Cleveland.

Mining Research — The Bureau of Mines is dedicating a new $2.5 million research center June 10. It is on a 57-acre tract between Minneapolis and St. Paul, Minn. The facility will handle metallurgical and mining research, and mineral resource studies.

Lead Center—National Lead Co. is building a multi-million dollar research center near Hightstown, N. J. It will contain separate units for research and development work for the company's major divisions.

Open House—All-State Welding Alloys Co., Inc., held its 15th anniversary open house and plant tour during the National Welding Suppliers Assn. convention in New York. The White Plains, N. Y., company is building a new plant for rapid testing by non-destructive methods of Spoolarc aluminum alloys.

New Canadian—Rotor Tool Co. of Cleveland has formed Rotor Tool Co. of Canada, Ltd., with main offices in Toronto, Ont. The new Canadian company is a wholly-owned subsidiary of Rotor Tool, and an affiliate of Cooper-Bessemer Corp. of Canada, Ltd.

Hoffman Shift—Hoffman Industries, Inc., has acquired the air appliance and filtration divisions of U. S. Hoffman Machinery Corp. The current operating management remains.

Joint Deal—Ajax Magnethermic Corp., Youngstown, has bought 50 pct of the stock of Safety Electrical Equipment Corp., New Haven, Conn. The remaining 50 pct has been purchased by a private group. Safety Electrical makes special motor generators and controls and railroad air conditioning systems.

Foxboro Buy—Foxboro Co. of Foxboro, Mass., is acquiring Waugh Engineering Co., Van Nuys, Calif., manufacturers of electro-mechanical and electronic instruments.

Full Owners — Johnson Bronze Co., New Castle, Pa., is acquiring Ferro Powdered Metals, Inc., Salem, Ind. The powder metallurgy parts division of Johnson will be relocated and combined with Ferro at Salem.

Tool Trade—Beloit Tool Corp., Beloit, Wis., has purchased Walter T. Cole Tool Co., Scottsdale, Ariz. Both companies make taps and other cutting tools.

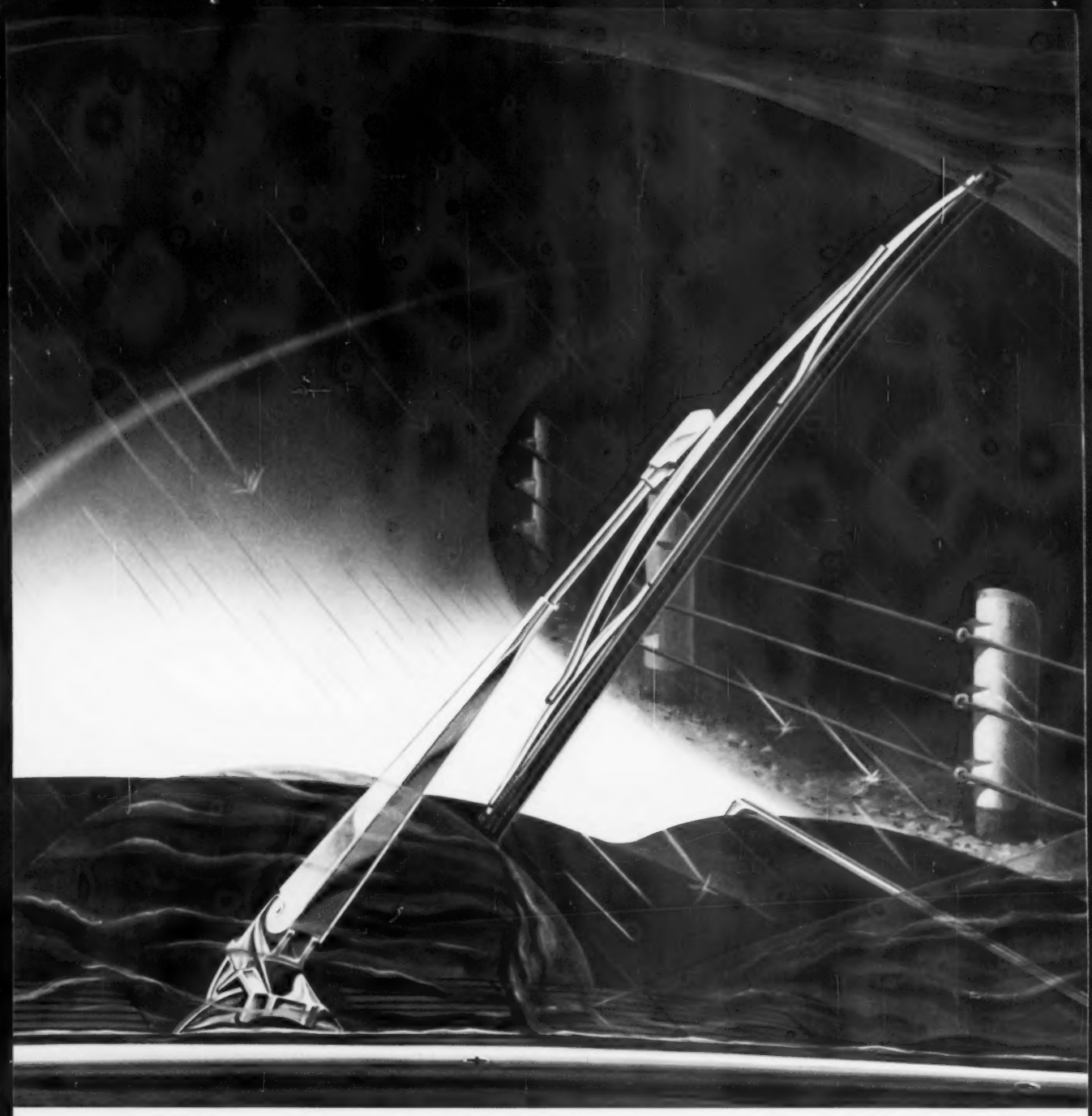
Ohio Purchase — Cooper-Bessemer Corp., Mount Vernon, O., has purchased Kline Manufacturing Co., Galena, O. Kline makes hydraulic pumps and motors.

Full Control—Pacific Foundry & Metallurgy Co., San Francisco, has purchased C. O. Bartlett & Snow Co., Cleveland. The new corporation will be known as Bartlett-Snow-Pacific. It will continue to produce mechanized foundry equipment.

New Assets—Fairbanks, Morse & Co., Chicago, has purchased Herold Radio & Electronics Corp., Yonkers, N. Y. The electronics and scale divisions of Fairbanks, Morse will be consolidated at Yonkers.

Gear Manufacturers Name New Officers, Present Award

WINNERS ALL: New officers for 1961-62 were elected at the 45th annual meeting of the American Gear Manufacturers Assn. this week. They are, left to right: President, C. F. Bannan, Western Gear Corp.; vice president-products, J. H. Jackson, Jackson Gear Co.; vice president-technical, Folke Richardz, Westinghouse Electric Corp.; and treasurer, R. C. Ball, Jr., Philadelphia Gear Corp. C. R. Burrell (far right), president of Cincinnati's Tool Steel Products Sales Corp., was awarded the AGMA's "Edward P. Connell" award for his "many and valuable contributions as an industry representative in government and for his guidance in producing the AGMA Gear Classification Manual." The award is usually given annually.



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But service is only one of the overall cost-saving benefits Inductotherm offers. For a look at the entire story, ask to have an Inducto engineer call. Inductotherm Corporation, 412 Illinois Ave., Delanco, N. J.

INDUCTOTHERM

Interest Rates React to Upturn

Even now, as the recovery gets under way, interest rates are starting to edge up.

But, barring a swift, steep climb in business, there probably won't be much change until early '62.

■ As the recovery builds up steam, there will be upward pressure on interest rates.

In the case of long-term rates this will run counter to the Administration's announced policy of holding them down. As yet, there are no signs the President is ready to abandon this policy.

Despite the influence of the business upturn, it's not likely interest rates will advance much—at least for a while.

Fast Reaction—But what's happened in the last few weeks shows clearly how rates react to stimulation. Long-term rates have started moving up a bit. Short-term rates have also begun advancing.

Other forces besides the recovery are operating to put pressure on credit. Increased spending by the Federal government is one. Even before the President asked Congress to step up spending for defense, space, foreign aid, and manpower training, there was talk of a budget deficit this year.

More Red Ink—Now with more funds requested, the Federal government will probably journey deeper into the red ink. This means the government will need to increase its borrowing.

As mentioned, the trend was apparent even before the drive to boost spending. On an annual rate basis, Federal government buying of goods and services dipped to a 1960 low of $51.7 billion in second quarter of '60.

Since then it has been rising. In the first quarter of 1961 spending was at an annual rate of $54.5 billion with national defense a big factor. By the fourth quarter of '61 this could rise to a rate of about $55.5 billion.

A budget deficit of $4-$6 billion for fiscal 1961 is quite possible. Some estimates place it even higher.

Spending by state and local governments is also rising, expected this year to be about $3.5 billion over 1960.

How much and how soon interest rates increase depends mainly on the business recovery. A rapid, steep climb will encourage borrowing more than a slow, gradual advance. If the recovery should flare up strongly there will be a greater scramble to build inventories and beef up spending for new plants and equipment.

Watch Early '62—Right now, there doesn't appear to be any strong pressure on interest rates. In fact, more borrowing in the long-term market has been urged—and encouraged.

However by early 1962 change is likely. By then, prices will probably have responded to the healthy business climate and moved up. And, in all likelihood, so will interest rates.

How to Survey Employees

■ Top management is sold on employee surveys, but only when they are followed up.

This is one of the conclusions in a study of 155 companies conducted by the National Industrial Conference Board. There's little urge, the NICB notes, for a company just to find out what the situation is. The emphasis is now on feedback.

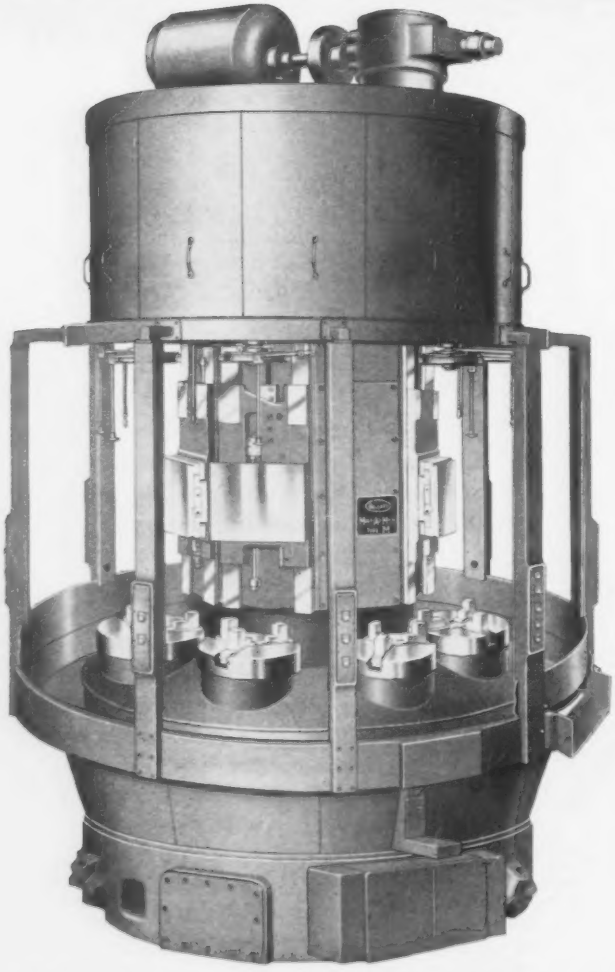
Feedback's Role—In order to interpret findings accurately, management often finds it helpful to go back to employees for more information. Feedback, which includes discussing as well as reporting the findings, is a means of getting that information.

While feedback may be written, many companies favor group meetings for more effective flow of information and ideas between managers and employees.

Almost all the companies surveyed assign responsibility for follow-up to specific individuals. Committees are frequently involved in follow-up activities. The reason: This method gets more members directly involved where action is originated.

Interest in follow-up work may have to be sustained over a long period. This calls for careful planning by the most capable people in the organization.

NOW BULLARD PRICED LOWER!



NEW Bullard Mult-Au-Matic Type "M"

Contrary to the general upward trend in the cost of new plant production equipment, The Bullard Company is offering the *new* Type "M" Mult-Au-Matic at a price which is *lower than competitive methods.*

Designed and built according to exacting Bullard standards, the *new* Type "M" Mult-Au-Matic incorporates many new features of rigidity, accuracy and productivity which have made this machine famous the world over.

For complete information on the *new* Bullard Type "M" Mult-Au-Matic, call your nearest Bullard Sales Office or Distributor or write to

The Bullard Company, Bridgeport 9, Conn.

Automakers Ready for 1962

Annual Changeover Shutdowns Are Slated for July

Latest reports say most of the auto industry will shutdown in mid-July. Production of the new models is planned for August.

But the public will probably have to wait longer for the debuts of the new models this year. By A. E. Fleming

▪ Most automakers will stop producing 1961 models in July. They'll start 1962 models in August.

Model changeover dates remain tentative at this time. Consideration must be given to sales trends, and to the number of new cars each company believes it can sell throughout the summer. Inventories must be anticipated, an especially tricky problem in this new labor contract year.

But current reports say the Big Three will pull their annual summer closedowns in rapid order starting in mid-July.

Drop Coming—This would bring a drop in car output to perhaps 350,000 cars in July from over 500,000 in June and May. A decline to perhaps 250,000 in August is likely.

Every company will get at least a few 1962's out of the factory before present Big Three-UAW contracts expire at the end of August. But none will have time to push out too many. This indicates industry is banking on smooth sailing at the bargaining front, and the opportunity to really send out the new models in September.

Later Debuts—The public probably will have to wait a little later this fall to see 1962 cars. The 1961's arrived, for the most part, in late September and early October. Mid-October seems a more logical choice for '62's debuts.

Oldsmobile's Lansing, Mich., plant is tentatively scheduled to end 1961 model output July 16. The first 1962's are set to run through the factory Aug. 7.

On July 20, Chrysler Corp.'s Lynch Road plant, Detroit, where Plymouths are made, will close. Intentions are to start again Aug. 15.

Two General Motors Corp. facilities and a Chrysler unit will wind up current model activity July 21, according to present plans. These are: Pontiac, Pontiac, Mich. (to resume on 1962's Aug. 17); Corvair, Willow Run, Mich. (to resume Aug. 14); and Chrysler's Jefferson plant, Detroit, where Chryslers, Imperials and Dodges are produced (to resume Aug. 14).

Other Schedules—Cadillac's Detroit plant is expected to send its workers vacationing on July 24 with an Aug. 21 return date in the offing. Buick's Flint, Mich., plant will wind up July 27, and get going again on Aug. 21.

Three plants are setting July 28 closing dates—Chevrolet in Flint (underway again Aug. 21); Dodge Main in Detroit, where Darts, Lancers and Valiants are built (to resume Aug. 15); and Mercury in Wayne, Mich. (up again Aug. 21).

American Motors Corp. and Studebaker-Packard Corp. are expected to have the same down periods as last year, or close to them. This would peg AM as idling its operations Aug. 7 to 21; S-P, July 24 to Aug. 21.

Buyers Seek Economy, Convenience

MORE AND MORE: Buyers of Dodge trucks are demanding six-cylinder engines, automatic transmissions and other features such as cigarette lighters and radios in increased numbers this year. These added features are included in many of the above trucks shown heading for dealers in 17 states during one of the biggest truck driveaways in Dodge division history.

here are a few IDEAS

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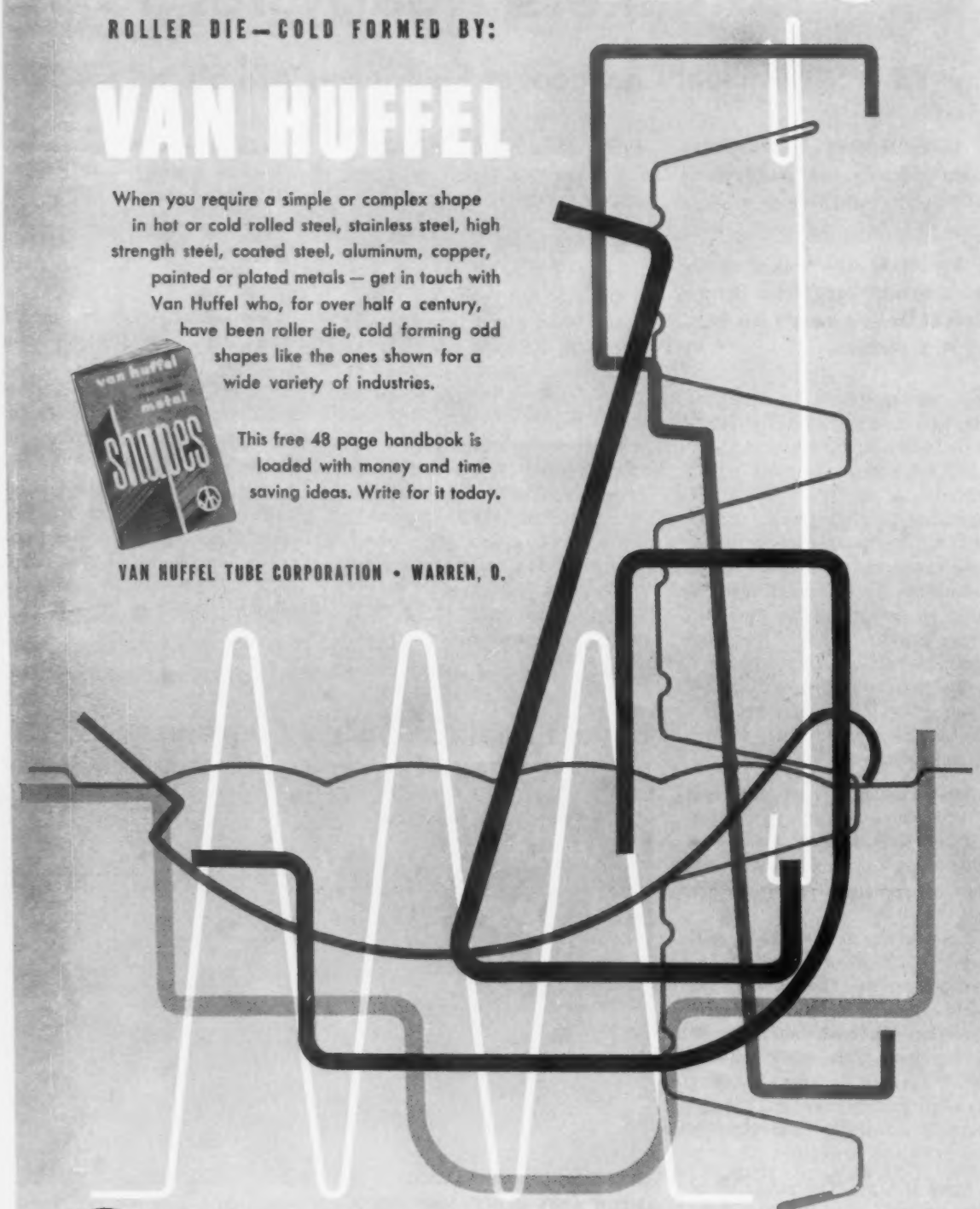


WHERE IDEAS TAKE SHAPE IN METAL

California Needs More Customers

It Would Like to Tap New Out-of-State Markets

California is its own best customer as its industry strives to meet the needs of its continuously growing population.

But a new state-sponsored study shows that more outside customers are needed.
By R. R. Kay

■ California's best customer is California. But as the state grows, it must find more out-of-state customers.

These marketing facts-of-life are from an important study by the state's Economic Development Agency. Aims: To get California's market picture into sharp focus and to help bring new industry.

Behind much of the state's postwar boom is its population explosion. It leaped 60 pct between 1947 and 1959.

First Such Study — The state keeps busy supplying its own growing needs. And it meets consumer demands of out-of-state buyers. But it must get more of this business, the report says.

Today, 1.7 million of the state's 6 million workers supply purchasers from all across the country. Of the 1.7 million, some 700,000 supply goods and services to the Federal government for out-of-state use.

"This is the first study of its kind ever undertaken in California," says Gov. Edmund G. "Pat" Brown. "If our business, labor organizations, farm groups, and governmental bodies are to make intelligent decisions for the future, they must know this market picture in detail."

Keep These in Mind—Memo to marketers: These facts from the study can be helpful in your forward planning:

1. 64 pct of all civilian workers are in two areas: Los Angeles-Long Beach and San Francisco-Oakland.

2. 383,000 Californians work in residential building.

3. Foreign sales keep 112,000 busy in the manufacturing industries alone.

4. Companies with over 500 workers sell more products out-of-state than do smaller California companies.

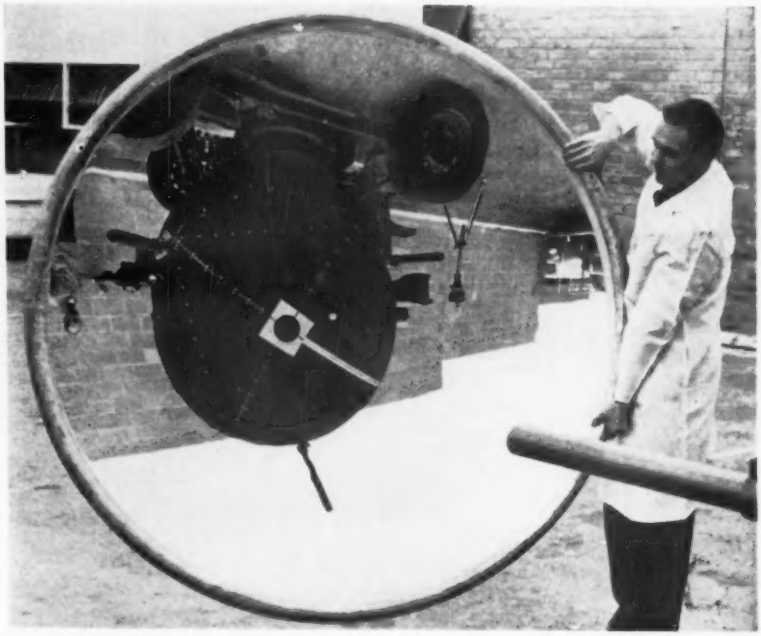
Get the Story—If you want the full story, drop a line to the California Economic Development Agency, Sacramento, Calif. Ask for the 97-page report, "Markets for the Products of California."

A New Addition

Joseph T. Ryerson & Son, Inc., has just completed a 13,000 sq ft addition to its Seattle steel and aluminum service plant. This permits consolidation of all Seattle operations at 1200 Fourth Ave. South.

The new facility will be used to warehouse sheet steel in atmospherically controlled surroundings, for rapidly expanding aluminum stocks, and for storage and assembly of wire into tendons for prestressed concrete.

Lightweight Reflector Can Do Many Jobs

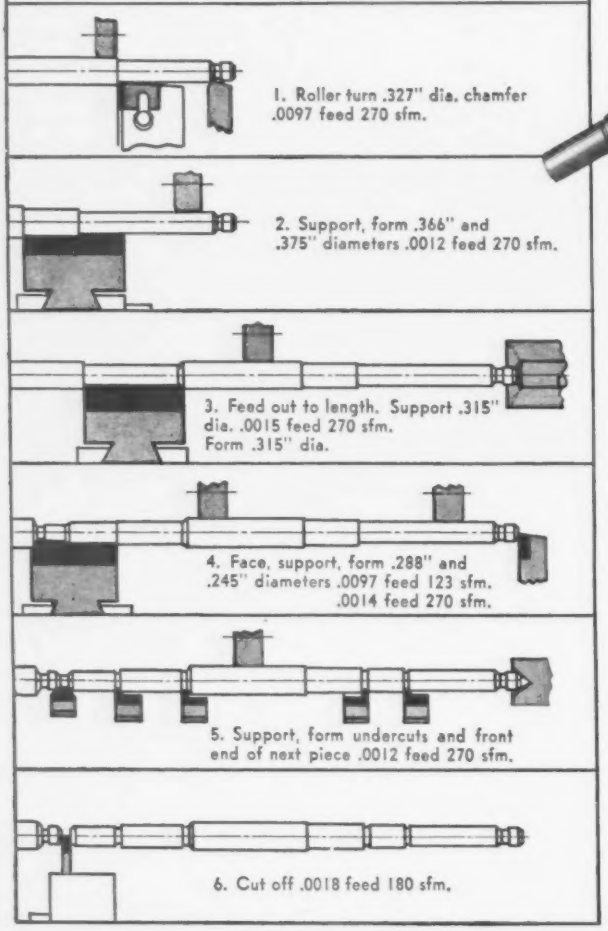


REFLECTIONS ON METAL: This all metal lightweight reflector weighs less than 0.7 lb per sq ft. Developed by Electro-Optical Systems, Inc., Pasadena, Calif., reflectors of this type are now available for use in infrared detectors, radar antennas, and solar energy collectors.

GREENLEE AIR-FEED AUTOMATICS BENEFIT "ELECTROLUX" FOUR WAYS . . .

MACHINE . . . 1"-6 Automatic Bar Machine Air-Feed — Feedout on index and in 3rd position during machine cycle.
TOOLING . . . Carbide Tipped
MATERIAL . . . 1137
STOCK SIZE . . . 13/32" rd.

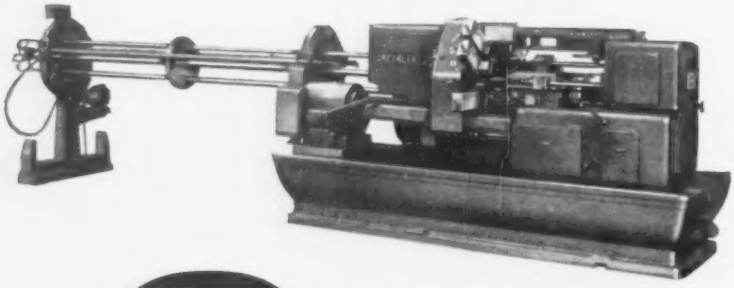
TOOL SLIDE STROKE . . 1-9/16" at .0097" feed.
SPINDLE SPEED . . . 2540 rpm 270 sfm.
MACHINE TIME . . . 5.8 seconds.
ESTIMATED GROSS PRODUCTION . . . 620 per hour


1. Roller turn .327" dia. chamfer .0097 feed 270 sfm.
2. Support, form .366" and .375" diameters .0012 feed 270 sfm.
3. Feed out to length. Support .315" dia. .0015 feed 270 sfm. Form .315" dia.
4. Face, support, form .288" and .245" diameters .0097 feed 123 sfm. .0014 feed 270 sfm.
5. Support, form undercuts and front end of next piece .0012 feed 270 sfm.
6. Cut off .0018 feed 180 sfm.

1. Eliminate stock pushers . . .
2. Eliminate scoring of stock . . .
3. Reduce downtime during set-up . . .
4. Provide extra length feed-out . . .

The part is a 6-7/8" long armature shaft used in the "Electrolux" vacuum cleaner. It demonstrates how effectively Greenlee Air-Feed Automatics and carbide tooling can team-up to increase production and reduce costs. The shaft is machined from 13/32" S.A.E. 1137 steel at a gross production rate of 620 pieces per hour. Recommended cutting speed for high speed tooling is 120 sfm. The rate was boosted to 270 sfm with carbide-tipped tooling. Sequence of operations is shown at the left.

Note how the stock is partially fed out on the index and to its full length in the third position. This provides for the most effective tooling arrangement. Greenlee Air-Feed Automatics permit greater job versatility and assure added profits. See your Greenlee representative or send us a print of your high-cost problem-part.



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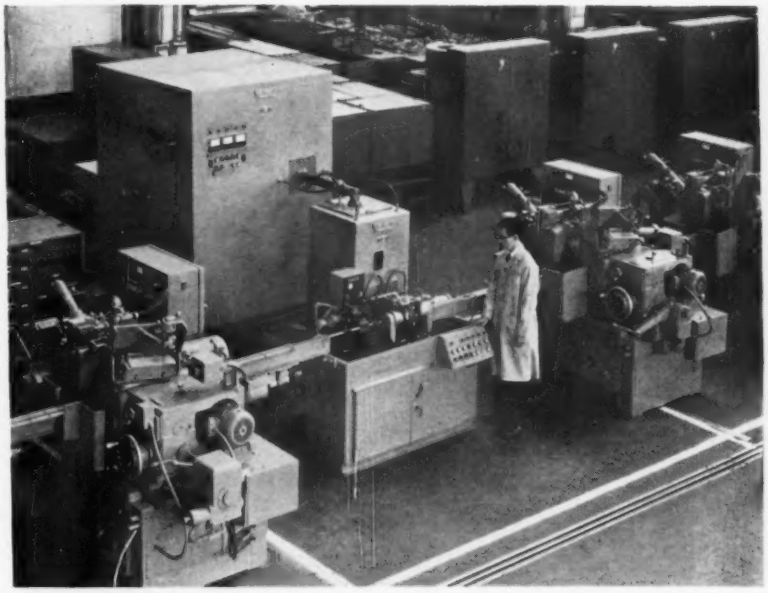
Heat Treating Goes Automatic

Cincinnati Milling Co. has come up with a new process for automatic heat treating.

Key to the development is compact design and adaptability. The system will reduce cost and increase output.

By R. H. Eshelman



FAST WORK: A workman examines the integrated flow-through production line of an automatic induction heating machine and five centerless grinders developed and engineered recently by the Cincinnati Milling Co.

■ A series of interesting metalworking operations seldom combined in continuous flow production have been integrated into a unique new automated line. Automatic processes include rough grinding, selective surface hardening, and precision finish grinding.

The line, designed and engineered by Cincinnati Milling Co., was developed to eliminate repetitive work handling. Work pieces are 5/8-in. diameter piston rods for shock absorbers. The material is cold drawn steel, SAE 1040.

Despite varied requirements of individual machines and operations, tooling and conveying systems are designed so the parts feed through the six units at a constant rate of 12 ft per minute. This rate then achieves a design production rate of 960 pieces per hour.

Marked Trend — Howard W. Carlisle, manager, Cincinnati Milling's meta-dynamics division, says "There is a marked trend in the field of selective surface heating toward building block automation. More and more high-production, special-purpose heating units are being built for standardized components."

He also notes: "Modular design makes it possible to combine productive advantages of specialized design and, at the same time, provide the built-in flexibility for post-installation change."

Key to the development is compact design. Also, the units are adaptable to automatic work handling.

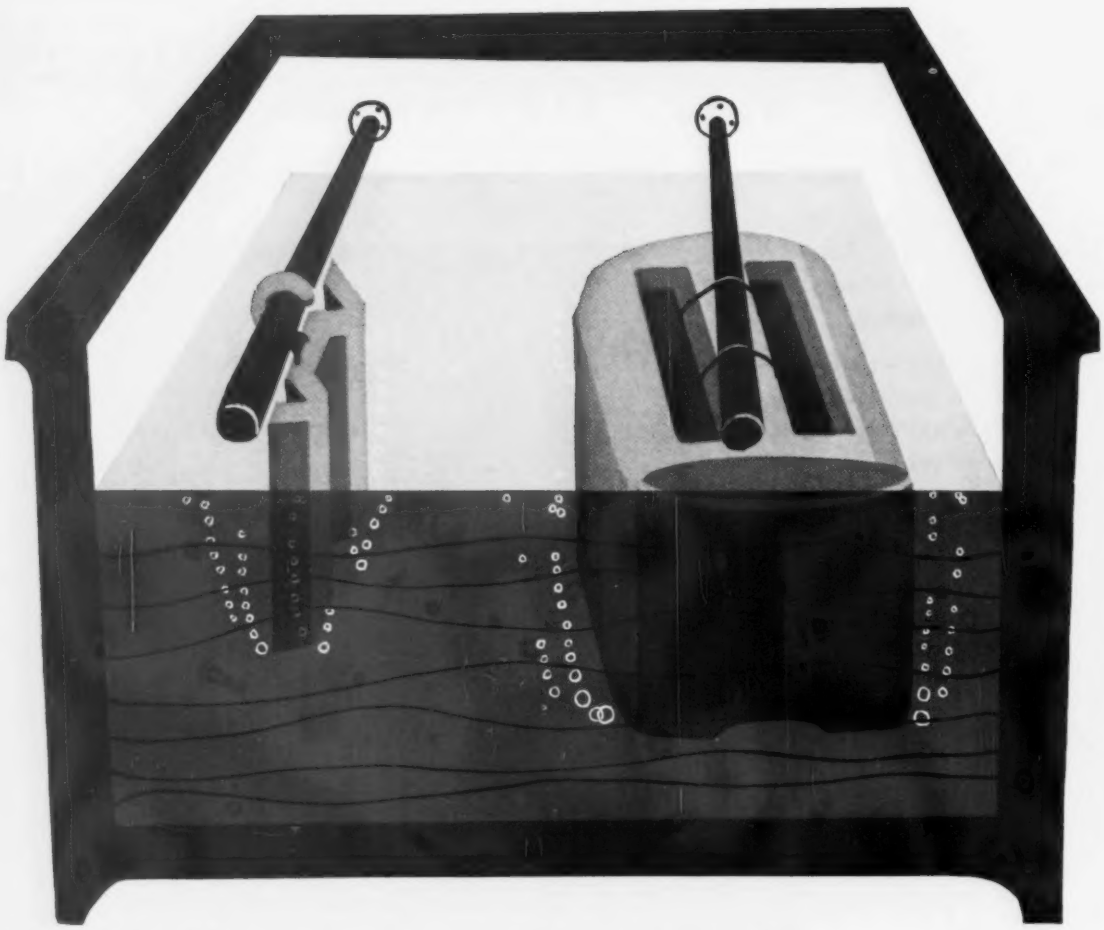
The Process—At the beginning of the line, rods feed from a hopper to the first section of a motorized conveyor. This links the six machines. The conveyor delivers the rods to the first centerless unit for the rough grinding. It removes an average of 0.0065 stock.

Induction heat treating follows. Here, the parts are rotated and fed through the induction coil at the same rate as the grinding operations. This gives a uniform case of 50 Rc, 0.020 deep as they pass through the induction coil and quench ring.

Since ends of the rod must remain soft, heat must be confined to the center. This selective hardening of the moving rod is achieved by the high speed of radio frequency heating. As each rod reaches a certain point, a sensing device energizes the coil. Result: A brief, accurately-timed heating cycle.

For Finishing—From this operation, the parts are automatically moved to the first of four centerless grinding machines for finishing. Stock removal in this feed-through process is 0.004, 0.002, 0.001, and 0.0005-in. respectively. Completed parts have a 5-10 rms surface finish. They are within tolerances of 0.0001-in. for roundness; have a 0.0002-in. taper; and 0.0002-in. straightness.

This concept of integration of standardized components in an automatic line holds down capital costs. Both increased output and a big reduction in handling are expected to pay off in substantially lower unit costs of the piece-part.



Cut plating preparation costs with the Pennsalt System Approach

You might be surprised at how economical and effective cleaning prior to plating becomes when the Pennsalt System Approach is working for you. There's no magic in this idea; just good sense and good products. We supply both cleaning chemicals and the equipment that applies them. Result: we engineer them to work together . . . and we live with them month after month in your plant.

The materials. Silicated and nonsilicated compounds for precleaning by soak or spray. Direct- and reverse-current electrolytic cleaners. Rust and corrosion removers.

The machines. Automatic power spray washers. Immersion tanks. Agitating tank washers for small parts. Drying ovens. Belt and monorail conveyors integrated into your line for mechanized handling. Custom-engineered to your production requirements.

Other "work-together" combinations from Pennsalt. Pickling compounds, drawing lubricants and Fosbond® phosphating agents . . . and the automatic machines designed to work with these materials.

Personalized service. Specialists from our nationwide organization analyze your process needs, help with installation and start-up, then make regular service calls to keep your finishing line running efficiently. Call or write for a consultation, and for our free booklet, "The Pennsalt Metal Preparation Service Plan."

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W. T. Adams, elected vice president, purchasing, Republic Steel Corp.

Radio Corp. of America—**W. W. Bomn,** named manager, Atlanta branch office, Electronic Data Processing Div.

Producto Corp.—**D. J. Williams, Jr.** — named manager, Cleveland plant.

Berger Steel Co., Inc. — **T. J. Lang,** elected vice president, production; **C. R. Millikan,** elected vice president, sales.

Jessop Steel Co.—**S. J. Clokey,** named president, Jessop Steel of Canada, Ltd., Wallaceburg, Ont.; **T. W. Gabriel,** named president, Jessop Steel International Corp., headquarters at East Orange, N. J.; **E. S. McIntire,** named works manager, Steel Warehousing Div.

National Steel Corp.—**W. T. Harper,** named manager, sales, Enamelstrip Div.

Air Reduction Sales Co.—**V. B. Cassilly,** appointed asst. manager, sales, Tampa; **G. R. Rothschild,** appointed asst. director, metallurgical development; **G. C. Wingate,** appointed asst. manager, sales, Charlotte; **W. J. Greene,** appointed associate director - physical research, Central Research Laboratories, Murray Hill, N. J.

Spaulding Fibre Co.—**P. R. Obergfell,** appointed branch manager, Fort Wayne sales branch; **R. D. Davies,** appointed manager, mechanical development, Tonawanda, N. Y.; **R. L. Chilenskas,** appointed director commercial development.

Wyman-Gordon Co. — **L. K. Hutchinson,** named manager, operations, Eastern Div.

Allis - Chalmers Manufacturing Co.—**C. F. Wikoff,** appointed manager, quality control dept.; **K. R. Geist,** appointed general manager, special products dept.; **H. T. Larmore,** appointed asst. general manager, Construction Machinery Div.; **F. J. MacDougall,** named director, purchases.

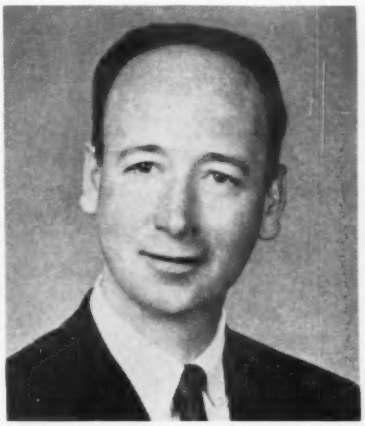
W. J. DeLancey, elected vice president and general counsel, Republic Steel Corp.

Armco Steel Corp.—**G. H. McClure,** named asst. manager, sales administration; **D. L. Hagedorn,** named asst. manager, central sales; **F. R. Ditmars,** named asst. manager, western sales; **B. F. Carothers, Jr.,** named asst. manager, eastern sales; **E. L. Singley,** named asst. manager, stainless steel products; **J. B. Rafter,** named district manager, Philadelphia. All of the Armco Div.

Carborundum Co.—**H. J. Killmar,** appointed manager, new products branch, Research & Development Div.; **F. J. Ross, Jr.,**

W. C. Bass, elected president, American Pulley Co. Div., Van Norman Industries, Inc.

J. E. Aldeborgh, elected executive vice president, Standard Gage Co., Inc.



Harold Tulloch, elected vice president, manufacturing, Vlchek Tool Co.

appointed asst. to the general manager, Bonded Abrasives Div.; **F. E. Massard,** appointed manager, advertising, Niagara Falls.

Caine Steel Co.—**F. J. Bradley,** named sales representative; **H. F. Hermann,** named warehouse superintendent, Chicago Div.

Chrysler Corp.—**D. M. Borden,** appointed chief engineer, automotive research, Engineering Div.

T. A. Straub, Jr., elected president, Fort Pitt Bridge Works.

Cincinnati Steel Castings Co.—**F. R. Geiser,** elected president.

Link-Belt Co.—**R. S. Meyer,** appointed director, manufacturing.

Shenango Furnace Co.—**J. K. Foster,** elected executive vice president.

The Ingalls Iron Works Co.—**M. H. Osburn,** named vice president, finance: treasurer and controller; **D. H. Bradley,** named director, manufacturing; **R. S. Anderson,** director, marketing; **C. T. Capp,** general manager-sales, custom products; **H. G. Miller,** general manager-sales, standard products; **F. W. Atchison, Jr.,** named staff manager, central marketing services; **G. W. Sorrell,** named manager, marine and plate sales—Southern region; **R. P. Sandefur,** named manager, structural sales, Southern region.

Bethlehem Steel Co.—**A. C. Plehiers,** appointed superintendent, reinforcing bar fabricating shop, south San Francisco.

W. C. Humphreys, elected vice president, Kaiser Bauxite Co., Kaiser Aluminum & Chemical Corp.

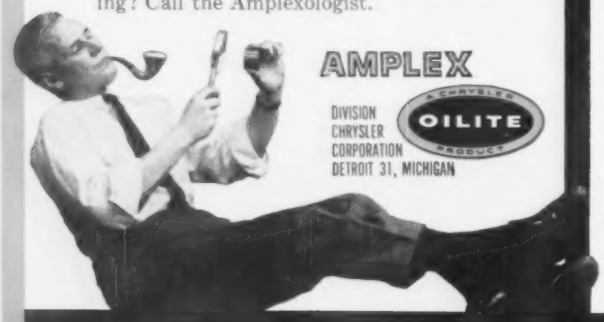
General Electric Co.—**L. E. Wengert,** appointed general manager, direct current motor and generator dept.; **K. J. Doll,** appointed manager, Eastern Region, service shops dept.; **R. L. Houlton,** appointed manager, Process Automation Engineering.

(Continued on P. 84)

THE AMPLEXOLOGIST

puts a customer in clover

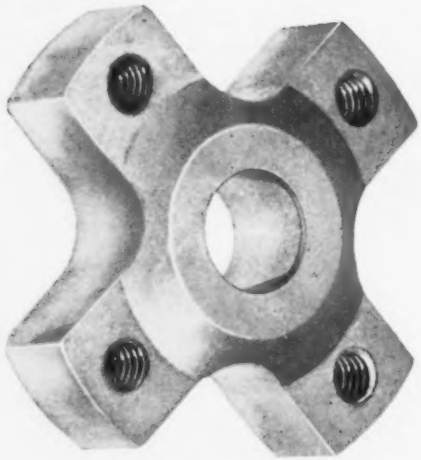
This engine fan-pulley hub was formerly a solid circular casting. The manufacturer had to machine the face, bore the ID, drill and tap four holes. The Amplexologist designed the present cloverleaf shape to reduce weight and material cost. Now produced by powder metallurgy, the hub requires no machining—except tapping the holes. Total savings 33%. Sound interesting? Call the Amplexologist.



AMPLEX

DIVISION CHRYSLER CORPORATION DETROIT 31, MICHIGAN

A CHRYSLER OILITE PRODUCT



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45 pages of technical information: How to determine correct applications for powder metal parts, bearings, filters.

2 NEW BEARING STOCK LIST
20 pages. 1066 standard sizes of Oilite self-lubricating bearings—bearing material. Selection guide, engineering data.

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Shape is as important as length, kind of teeth or degree of coarseness in selecting the right file for each job. That's why there are literally dozens of different shapes among the more than 6000 files in the Nicholson or Black Diamond line. The most basic cross-sections are shown above.

Now's a good time to check your supply of files – and the shape it's in... a good time to replace worn files and obtain additional file "shapes" so that you'll always have the right Nicholson or Black Diamond file for each requirement.

Your distributor* will be glad to suggest a sound file selection for your particular needs. Call him today.

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NICHOLSON U.S.A. **NICHOLSON** BLACK DIAMOND U.S.A.

(Continued from P. 82)

Revere Copper and Brass, Inc. —**J. M. Kennedy, Jr.,** appointed asst. chief engineer.

Metal & Thermit Corp.—**D. B. Orden,** named manager, Latin American operations, International Div.

Ford Motor Co.—**Eugene Bordinat, Jr.,** elected vice president; **S. A. Skillman,** appointed market representation manager, Ford Div.

Crane Co.—**N. B. Champ, Jr.,** elected vice president.

Bliss & Laughlin, Inc.—**E. M. Meyer,** appointed manager, Mansfield, Mass., plant.

Rheem Manufacturing Co.—**V. J. Heinis,** appointed president; **E. F. Paquette,** appointed executive vice president; **W. S. Goodfellow,** named vice president and general manager, Container Div.; **A. W. Nides,** named vice president, marketing, Container Div.

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Our inspection projector magnifies cutting edges to eliminate the minute angular deflection that could cause you costly production losses . . . just one of many inspections that account for Circle R quality.

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HACKENSACK — The Eaton Company
INDIANAPOLIS — Donald McIntire
MEMPHIS — Branch-Marwin Tool Specialists
MILWAUKEE — Ford Tool Company
MONTREAL — Humphrey D. Mellon
NEW HYDE PARK — The Eaton Company
NEW YORK CITY — J. V. Cromonin (Export)
PHILADELPHIA — General Tool Sales Co.
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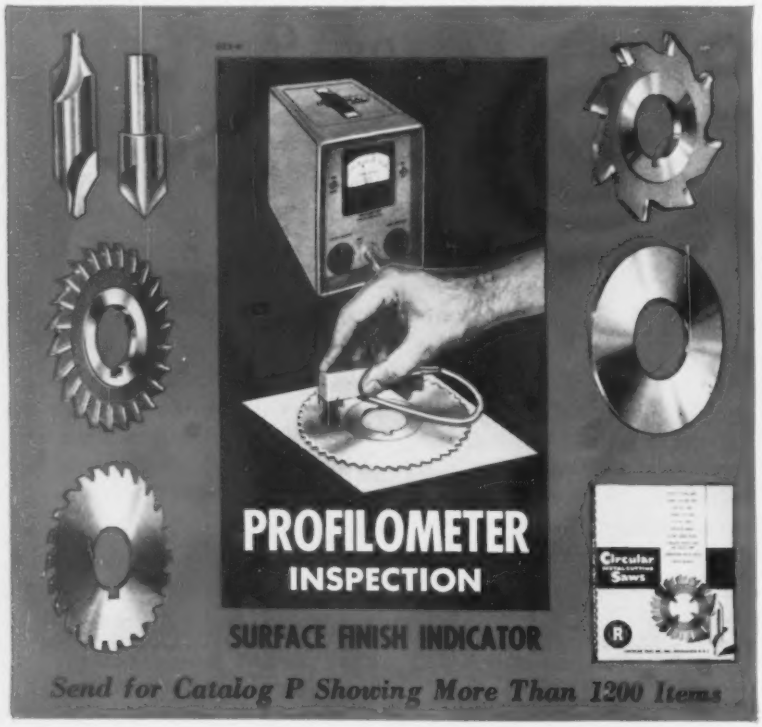

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H. S. Harrison, named president and chief executive officer, Cleveland-Cliffs Iron Co.

U. S. Industries, Inc.—**H. T. Kerr,** named asst. treasurer.

Lincoln Engineering Co. — **Carl Mueller,** appointed general manager; **John Renner,** appointed general sales manager.

Beryllium Corp.—**L. R. Larsen,** appointed sales engineer.

Pratt & Whitney Co., Inc.—**F. J. Hurst,** appointed asst. sales manager, carbide and distributor products.

Dodge Manufacturing Corp.—**J. M. Macy,** appointed asst. to the vice president, engineering.

J. S. Wilbur, elected senior vice president, Cleveland-Cliffs Iron Co.

OBITUARY

Leonard Geiser, president, Cincinnati Steel Castings Co.

The Chair Throwers

▪ Fred C. and Paul W., two employees in a metal-toy factory, had been needling each other for some time. The bad blood between them came to a boil suddenly while they were eating lunch in the company cafeteria. What followed was a fight, complete with chair throwing that would have made a movie director beam with pleasure.

No Oscars—The general foreman took a different view of it. He fired both men on the spot. During grievance discussions, the foreman admitted that men had fought in the past without incurring the extreme penalty. But this time, he said, the situation was different. If they had merely used their fists he might be lenient, but throwing chairs around endangered others and damaged company property.

The union wasn't satisfied with this explanation and brought the matter to arbitration, relying mainly on a past practice of more indulgent discipline in cases where employees had engaged in physical violence. How would you rule?

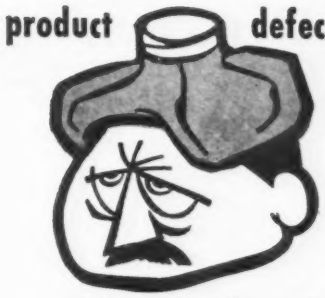
The Arbitrator Ruled:

He acknowledged that the discharges were not consistent with past practice. But he added: "It is not possible to evaluate all the different factors which led to discharge or retention of employees in prior instances of fighting. Under the circumstances here, it does not appear that discharge was too severe a penalty in this particular case."

From the files of
The American Arbitration Association

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for it in the July 13 issue.

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.



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✓ ***see "innards" directly*** with bright-image fluoroscopes

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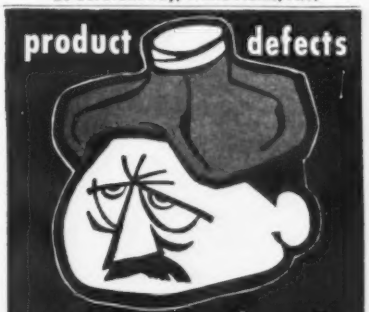

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buck up . . .

✓ ***x- or gamma radiography*** can find internal defects

✓ ***magnetic particle or dye penetrant inspection*** can find hidden cracks

✓ ***bright-image fluoroscopy*** lets you see "innards"

let us test for your best bet at our Industrial Applications Lab

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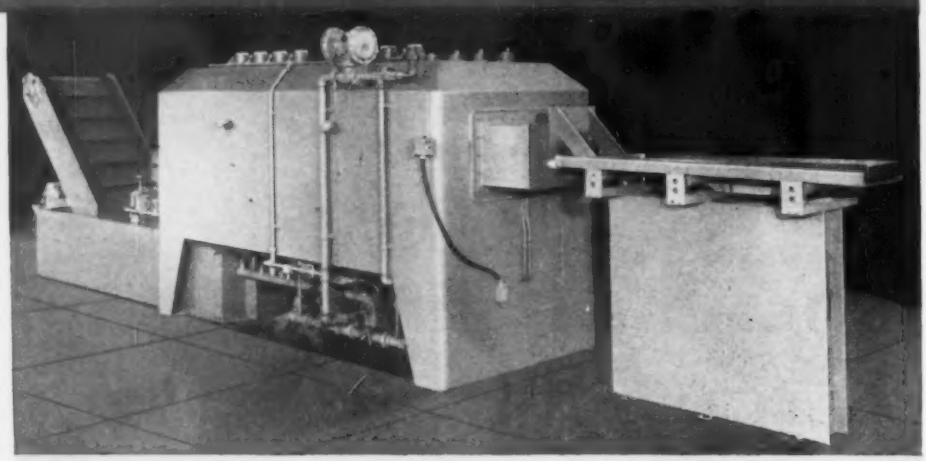

- Continuously Produces Bright Parts.
- Parts Heated By 100% Forced Convection For Uniformity of Temperature.
- Parts Individually Quenched For Uniformity and Maximum Hardness.
- New Shaker-Mechanism and Hearth Assures Uniform Case Depth.
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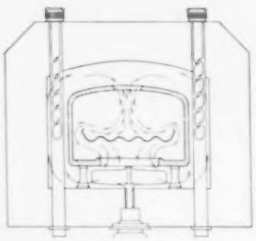

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Who Gets the Money?

Congressional support for President Kennedy's stepped-up space program is growing by leaps and bounds. Even critics of other parts of the President's vast new spending program agree that the U. S. can hold space spending back no longer. What this would mean in terms of dollars is:

$7-9 billion in the next five years. Major purpose: To return a man from the moon by 1970.

$531 million this year for a moon spacecraft using either liquid- or solid-fuel boosters.

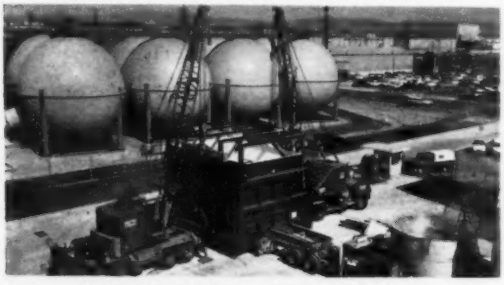
$28 million this year to accelerate the Rover nuclear-rocket program.

$50 million more this year for space satellites for world-wide communications.

$75 million extra this year for a satellite system for world-wide weather observation.

Bathtub Tests B-70

New 45,000 gal "bathtub" will be used for simulated flight testing of the B-70's crew compartment. The B-70 bomber is slated to fly at three times the speed of sound. The hydrostatic



STEEL BALLS: Reservoirs of air.

tank is the latest addition to the $10 million North American aerospace lab at Los Angeles International Airport. Huge steel balls in background hold air supply for the laboratory's trisonic wind tunnel.

From Subway to Space

A giant generator which once powered the Boston subway system is now leading a useful second life in space research. The 52-ton monster is anchored in 6 ft of concrete beneath the research laboratories of Lockheed Missiles and Space Div. It's furnishing heat to the 1-ft diam power chamber of a special wind tunnel which tests materials used in space flight.

Instant Space Station

Boosted into orbit in a package, this 30-ft expandable space station could be inflated into shape to permit one or more persons to live and

IT'S LIVABLE: 30 ft of manned tube.

work inside the tube for an extended period of time. Goodyear Aircraft is building a similar 24-ft diam station for NASA test use. Company officials consider the stations forerunners of even larger stations for orbit within three years.

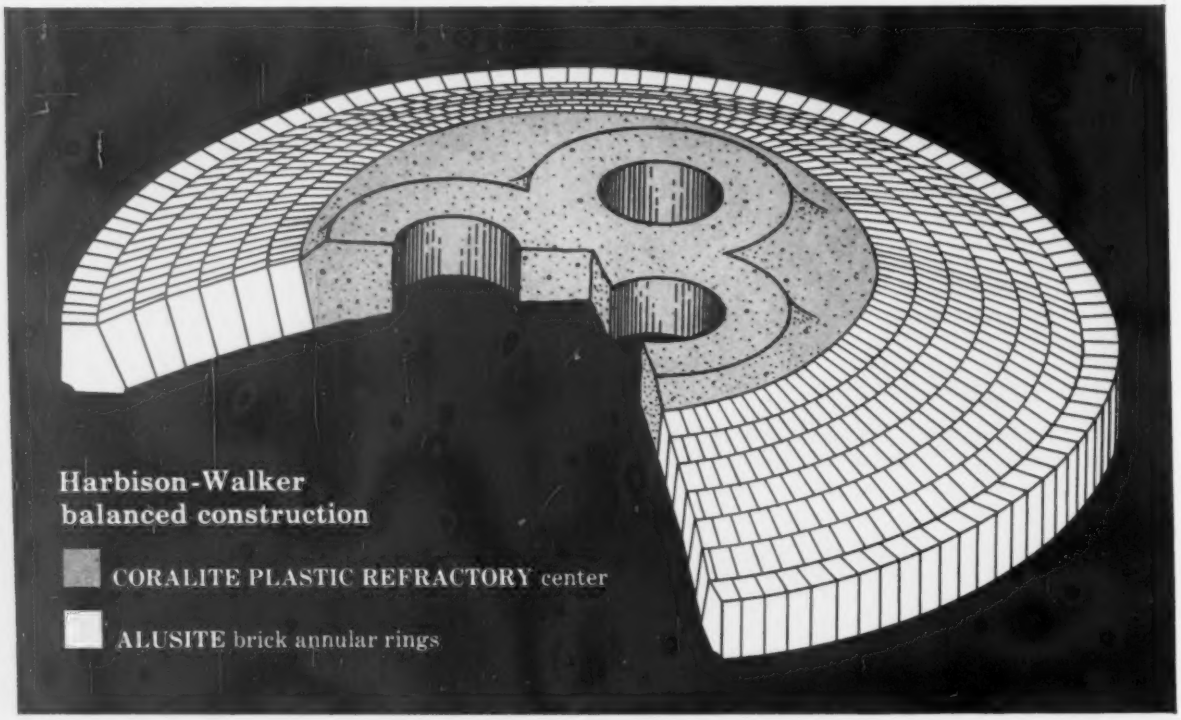
Prepare Custom Shapes

Now becoming available in commercial sizes and quantities are many of the Space-Age alloys. Even some of the refractory alloys will be available in custom sections such as I's, H's, V's, Z's, and L's. They may have thin tapers, square and sharp corners, and in lengths up to 24 ft.

Sapphires Protect Cells

Thousands of man-made sapphires will cover the surface of the communications satellites now being developed by Bell Telephone, says J. B. Fisk, company president. The first experimental phone satellite will be roughly spherical, but may have as many as 60 flat surfaces with solar cells mounted on them. The sapphires are expected to protect solar cells from space radiation.

plastic refractory centers for electric furnace roofs improve over-all economy



In electric steelmelting furnaces, balanced roof life is very important in over-all furnace economy. The center section is of particular significance since it is exposed to the most severe service. In some cases the center section is replaced at least once before the annular rings are consumed.

The use of CORALITE PLASTIC REFRACTORY in the center section with ALUSITE 70% alumina brick of standard sizes in the annular rings achieves balanced wear pattern and over-all increase in service life. Some shops report increases of 20% or more.

The superior wear resistance of CORALITE PLASTIC REFRACTORY is attributable to high refractoriness, low permeability and outstanding resistance to thermal spalling. The plastic composition provides a degree of workability that can eliminate laminations during installation.

For less severe service, a balanced roof life can be obtained with H-W MULLITE PLASTIC REFRACTORY center sections and ALAMO superduty fireclay brick or ANCHOR DASH 60% alumina brick standard sizes in the annular rings. Write for further data.

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World's Most Complete Refractories Service

HW 61-8

How to Step Up the Efficiency Of Assembly Line Operations

Is your assembly line out of balance? It's easy to check. An unbalanced line wastes workers' time and company funds.

Armed with just a pencil and paper, your plant engineer can remove any kinks in the line.

■ Assembly lines turn out all kinds of products from soups to special lock-nuts. The most efficient lines operate at 94-95 pct of possible output. But many of today's progressive-assembly lines waste from 10-25 pct of the workers' time.

If your assembly line isn't keyed to optimum worker output, you're pouring money down the drain. After all, the whole principle of mass assembly centers on a well-planned division of labor.

Bottlenecks and Waste—Generally, the work is divided into individual tasks. Then the tasks are assigned to consecutive workers, stationed along the line. As a product moves down the line, each operator performs his share of the allotted work.

The process of spreading the work among the operators is known as line balancing. Often, trial and error methods are used to balance the overall workload. In programming a line, some people rely on computers or math experts.

However, you don't have to go to all this trouble and expense to correct an unbalanced assembly line. Armed with a paper and pencil, your own plant engineer can do the job.

Simple Check—Here's a simple formula to compute the degree or percentage of unbalance in a given line. How does your assembly process measure up?

$$\text{Balance Delay} = \frac{A - B}{A} \times 100$$

where:

A is Max. Assembly-Stage Time
B is Aver. Assembly-Stage Time

The way to balance a line is to choose assembly-stage cycle times which will cause as little delay as possible. This must be done without exceeding the cycle time allowed at any one station. Of course, key factors in any progressive-assembly setup hinge on the nature of the work and the timing for each assembly stage.

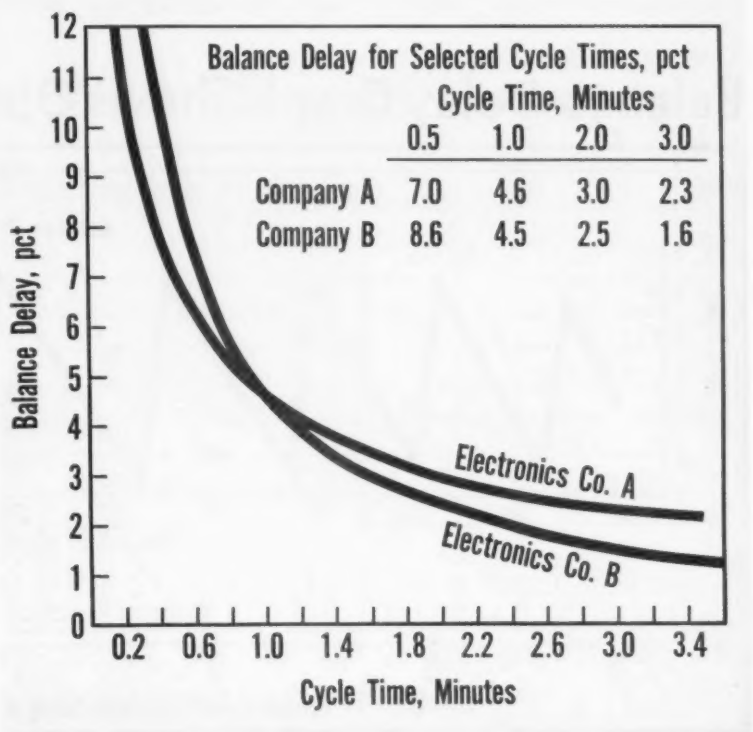
To renovate a line, the engineer adds up all assembly-stage working times used to make a total unit. Then he divides this figure by the number of workers. The result is an average cycle time for each station.

Who's Loafing?—Next, he subtracts the actual working time for each operation from the average cycle time. The difference between these figures yields the first clue

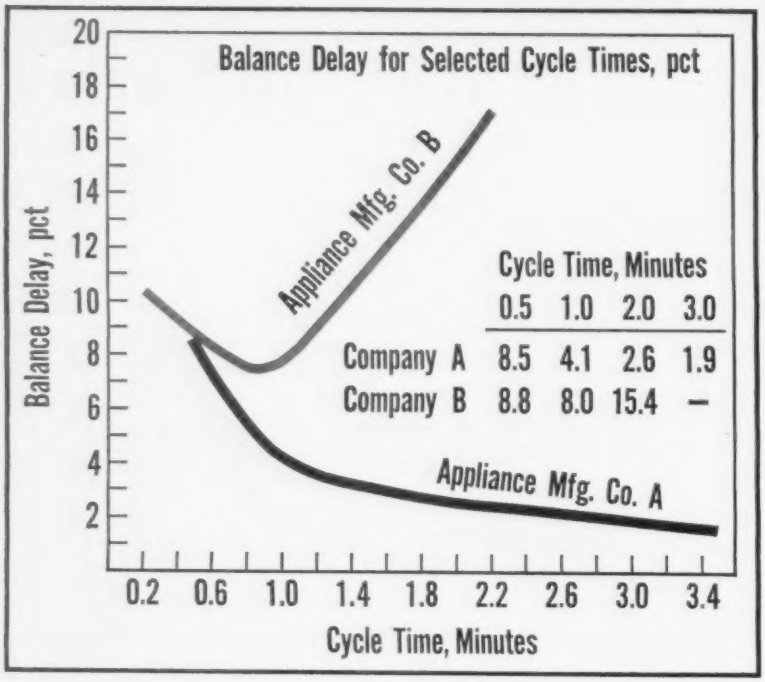
Longer Cycles Reduce Waste

Balance Delay for Selected Cycle Times, pct

	Cycle Time, Minutes			
	0.5	1.0	2.0	3.0
Company A	7.0	4.6	3.0	2.3
Company B	8.6	4.5	2.5	1.6



Fixed Stations Cause Delays



as to which workers are overloaded. It also helps to pinpoint the slackers. Everyone may look busy; but appearances can be deceiving.

The engineer can now draw up a sequence chart. Starting with the basic parts as they're delivered to the line, he lists and numbers each operation on each subassembly.

As he charts every operation, the engineer uses a colored pencil to mark the standard time next to each numbered work station. By grouping a series of operations, he evens out the total working time.

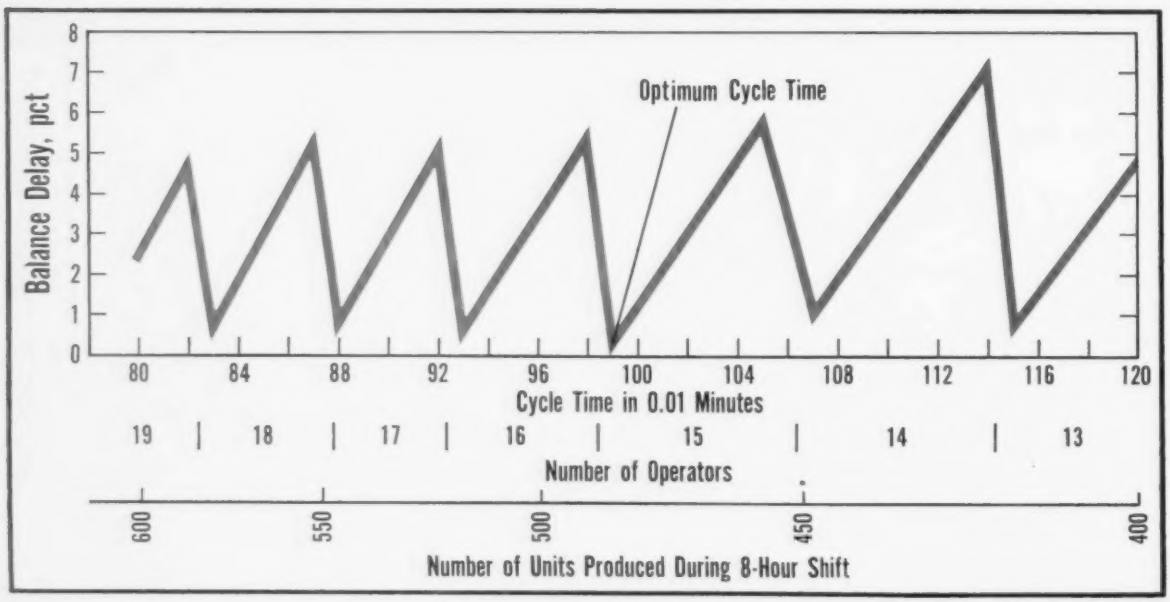
Flexible Schedule—All parts are numbered by sequence. Thus a glance at the chart shows the engineer how he can quickly re-distribute the work. He can't make a mistake as long as he follows the step-by-step numbered and color-coded pattern.

Operations analysts say this simple method is just as good as computer control. Several U.S. manufacturers are trying it out. Others are asking for more details. European interest is also high.

A. K. Hawkes, supervisor, Electronics Div., Armour Research Foundation, Chicago, heads up a team that will train engineers in the new assembly-line balance system. The men who developed this simplified system are Armour's Dr. Leon Wester and Dr. M. D. Kilbridge, University of Chicago.

Position Restrictions — In programming some lines, special problems arise. Position restrictions are common in the assembly of large, heavy items. A case in point is top-and-bottom restrictions. They exist when an item is inverted at

Balance-Delay Graph Shows Optimum Cycle Time



certain stations. This means the engineer must note such restrictions on his work-flow diagram.

Let's use a few simple charts to study the relationship between balance delay and the nature of the assembly work. Curves on these charts show the actual balance delay found in four companies.

The first chart indicates that in the electronics industry the degree of balance seems to be a function of the selected cycle time. With all things equal, you obtain a higher degree of balance as you increase the cycle time.

Fixed Facilities — The second chart depicts balance-delay curves from two appliance makers. One of these curves resembles the curves on the first chart. The other is quite different in two respects.

First, the amount of balance delay is higher for all cycle times. Second, the curve rises after a cycle of about one minute. All of the other three curves continue to fall off beyond that point.

Why does the fourth curve climb? No doubt, the major reason for the increase in unbalance is fixed facilities. It's hard to pack additional work elements into these fixed stations. Thus, as the cycle time gets longer these stations create points of high balance delay.

Balance-Delay Function — It's easy to chart the amount of unbalance in a line. In general, the graph has the shape of a zig-zag line that touches the cycle-time axis wherever a zero-point occurs. The third chart shows a portion of a balance-delay curve for a 19-station assembly line.

This curve is drawn for cycle times of 0.8-1.2 minutes. Within this cycle range, zero-balance delay results in a 0.99-minute cycle time. The cycle time in use on this line is 0.94 minutes. As a result, the optimum balance delay is 1.25 pct. Actual balance delay runs closer to a full 5 pct.

By switching the cycle time to 99 minutes, the company would obtain an optimum zero-balance delay. Such a simple change would boost the workers' efficiency. However, since the present setup lets the line operate at 95 pct of possible output, the company probably will not make a change.

Work Distribution — The last chart shows a typical distribution of work elements in the assembly of a television chassis. On this chart, you'll note that the two modes of highest frequency crop up at 0.09 and 0.2 minutes, respectively.

At 0.9 minutes, a large number of wires is placed and secured. Then at 0.2 minutes the chassis receives most of the soldered circuits. It's quite clear from the last chart how uneven the work distribution is at various timed stages.

For a given cycle length, the larger the number of small elements and the fewer big elements, the easier line balancing should be. Under the same conditions, lower balance delay is experienced.

Most of the balance delay at the majority of companies results from an arbitrary selection of cycle times. By using the simple working-sequence chart, your plant engineer can save a lot of this lost time.

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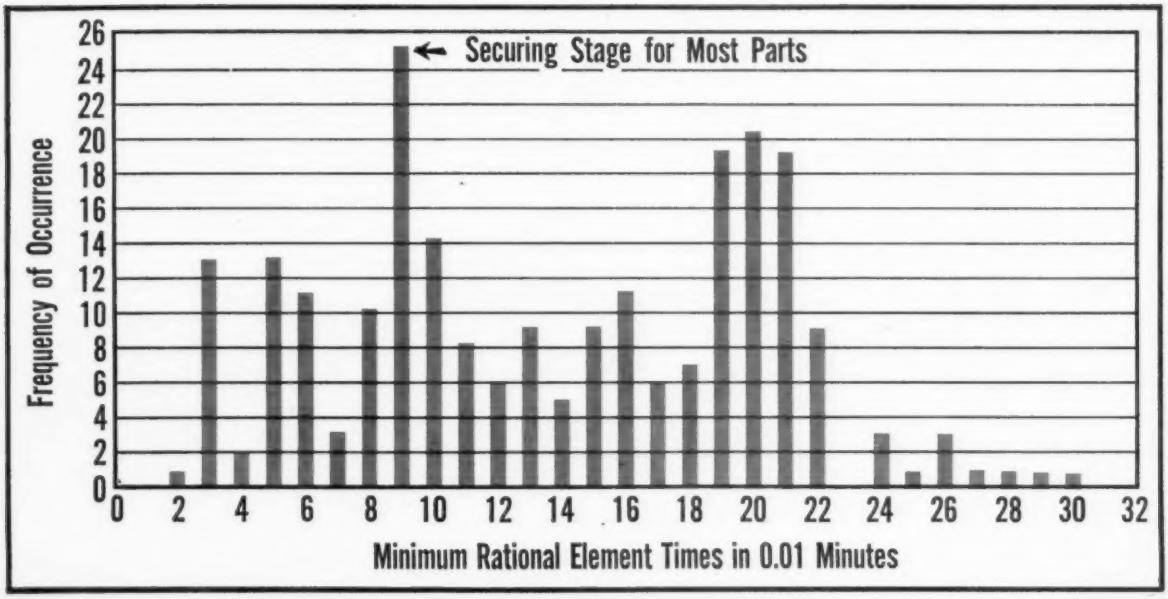
Distribution of Work Elements Is Important



New Oils Lick Rust Problem

Corrosion Inhibitors Protect Ferrous Metals in Storage

In the 14th century, the human race began to form ferrous metals into useful products.

But with iron, man encountered a problem. After a ferrous-metal part is made, how can it be protected from corrosion?

By **W. N. Redstreake**
Associate Editor

▪ In the United States, the corrosion of ferrous metals wastes an estimated $6-7 billion per year. This creates a drain on the pocketbook of every citizen in the nation.

Car owners, for example, spend more than $75,000,000 a year for the replacement of auto mufflers. But even if you don't own a car, you're still footing part of the bill for rust and corrosion.

Long-Term Protection — Uncle Sam has all types of costly war equipment and machine tools in storage. In case of war, this vital equipment must be ready to roll on a moment's notice. Thus, government interest in long-term rust prevention is quite high.

There are many preparations that inhibit or retard rust. Most withstand certain conditions for limited periods of time. A list of these products includes surface coatings such as asphalts, greases, oils and paints. The efficiency of these corrosion inhibitors hinges on their ability to physically retard oxidation.

Other rust preventives operate through chemical activity. A few of the chemical agents include phosphates, chromates, oxides and benzoic salts. There are hundreds of commercial rust preventives that use one or more of the chemical- and/or physical-protection ingredients.

No Breaks—Analyses of commercial metal preservatives bring to light a common problem. Each of these rust preventives must have intimate and completely - unbroken contact with the surface that's being protected.

Once broken, a protective coating loses its value. Paint tends to chip or crack. Oils flow at high temperatures. Some of the coating materials split in extremely cold environments.

Over extended time periods, chemical inhibitors wear out. Other degenerating factors tend to break down the strongest protective coatings. Even well-packaged machinery isn't immune from nature's powerful forces.

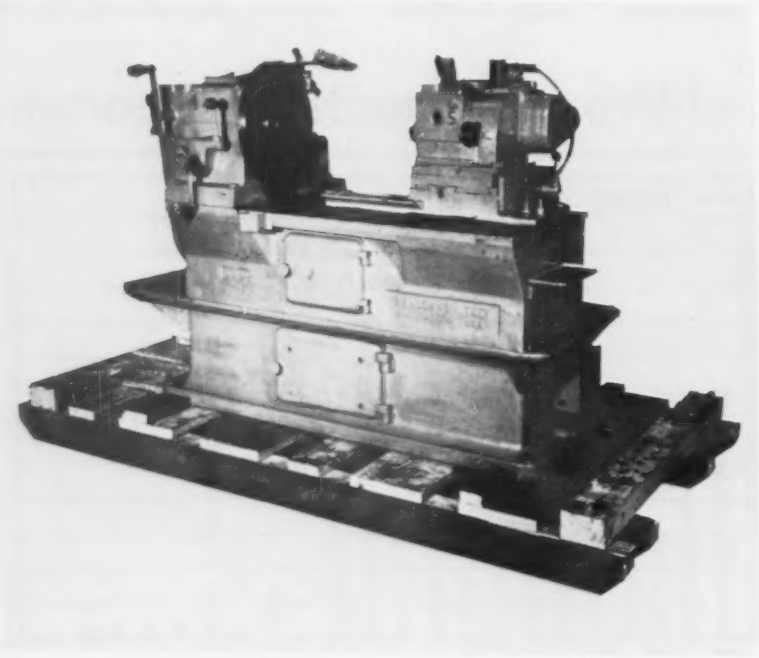
In preserving ferrous products, Uncle Sam has a big job on his hands. He has to safeguard all types of equipment, under all kinds of long-term conditions. Ships in mothballs must even withstand highly-corrosive salt - spray environments.

Oil Vapors—During the Korean Conflict, the government started a check on the effectiveness of crude embryonic oils in vapor form. Much of this research is still being conducted by the Ordnance Corps at the Rock Island Arsenal Laboratory, Rock Island, Ill.

In 1951, vapors produced in crystalline form were used with varying degrees of success. But many inherent difficulties limit the usefulness of these volatile vapors.

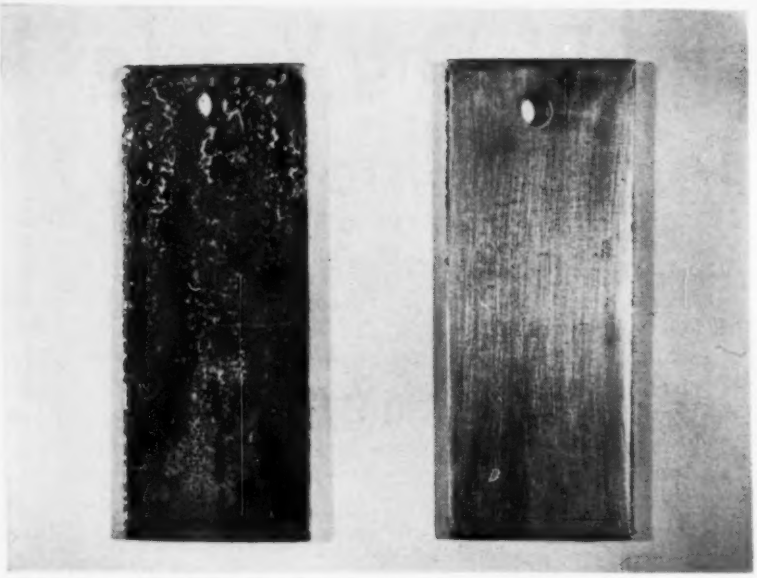
Some of the earliest vapor producers are so volatile that their service life is almost nil. Others are highly toxic. In the latter case, protective clothing and other special devices are a must.

Low vapor pressures produced by the crystals create another prob-



Rock Island Arsenal Ordnance Corps

READY TO STORE: Protected with a VCI-oil spray, a thread mill is shrouded for long-term storage. Nontoxic vapors prevent corrosion.



RIMMED STEELS: Enclosed in a moisturized container, each sample was cycled from room temperature to 170°F. After several cycles, both samples were left for 120 days. VCI oil guarded the test sample on the right.

lem. These pressures aren't powerful enough to force the corrosion-inhibiting vapors throughout large equipment-storage enclosures.

Early Attempts — Crystalline-form vapors have many other drawbacks. In lieu of listing these problems, let's note the fact that these materials don't enjoy the general useage and confidence of a few years ago.

However, these early crystalline materials did point the way to better and more efficient materials. The newcomers use the same concept of vapor inhibition.

Tests prove the newer, more powerful vapors pass through small crevices, machining holes, narrow etchings and grooves. Other common protective coatings can't cover and protect these hard-to-reach areas.

VCI Oils—One of the newest corrosion inhibitors is called Ferro-Gard. It's a product of the Ronco Laboratories, Pittsburgh. This volatile corrosion-inhibitor (VCI) oil consists of a lubricating vehicle, a contact inhibitor and a vapor producing component.

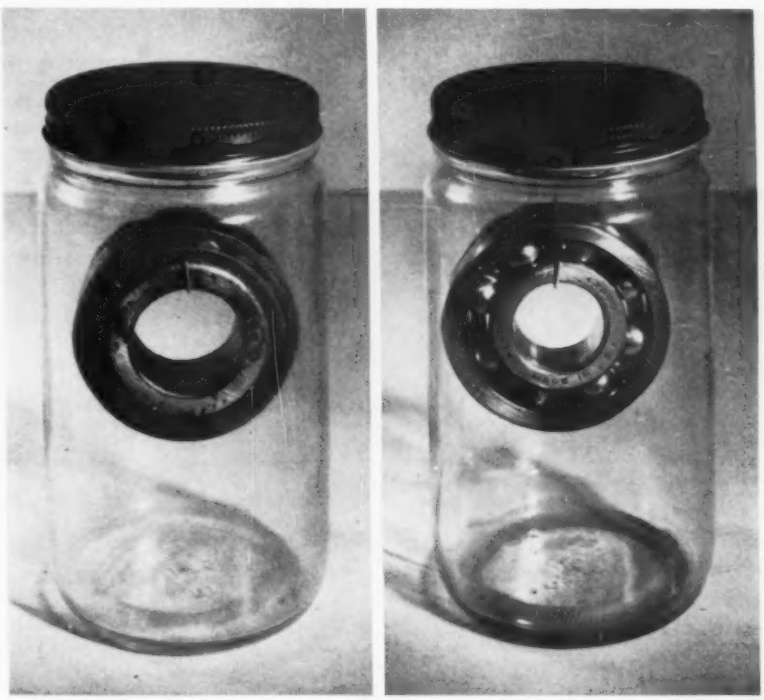
The lubricating vehicle produces good results by itself. And the vapor-phase component in this VCI oil offers a steady supply of long-lasting rust-inhibiting vapors. These vapors are nontoxic.

In essence, Ferro-Gard provides a lubrication medium, a contact preservative and a vapor-phase preservative. It can be compounded into any convenient viscosity. Thus, it can serve in almost any application where a good lubricating oil is needed.

Ready to Roll—One of the major bonuses of VCI oils centers on the fact that there's little time lost in placing stored equipment in service. Whenever depreservation becomes necessary, the corrosion inhibitor can be removed by conventional wiping or degreasing methods.

Since it's made from a base of high-grade lubricating oil, Ferro-Gard is well suited for protecting gear boxes, transmission cases, and hydraulic systems.

Application is simple. You can dip, brush or spray the protective coatings. For long-term protection, the treated equipment should be wrapped or packaged. Never bother to drain the equipment prior to packaging. A small amount of oil, left within the package, acts as a source of continuing vapor activity.



SUSPENDED OVER WATER: Both jars contain an equal amount of water. After repeated temperature cycling, note how the one bearing has corroded. A few drops of Ferro-Gard in the water protected its mate.

Heat-Treat and Plating Wastes Go Up in a Puff of Smoke

A new incinerator thrives on cyanide wastes from heat-treating and plating operations.

Combustion is complete. Exhaust gases can't contaminate the air or pollute waterways.

▪ Cyanide-waste disposal poses a major threat to streams and waterways. For a long time, this industrial menace has been the problem child of pollution-control experts.

However, this tough disposal headache is now a thing of the past at General Motors' Oldsmobile Div., Lansing, Mich. A special incinerator burns off all heat-treating and plating wastes. It's so efficient that no detectable amounts of cyanide are present in the exhaust.

This incineration system is the brainchild of engineers at Prenco Mfg. Co., Royal Oak, Mich. As installed, it's a semiautomatic unit. Present modifications will soon convert it to full automation.

Nontoxic Disposal—Basically the disposal equipment includes: A giant refractory-lined steel stack, a burner unit, storage tanks, hoppers, mixing vats, pumps, valves and controls.

All cyanide wastes are delivered to the burner site. Here, they're mixed with soluble waste oils; then the mixture is burned at high temperatures. The end result is completely-nontoxic disposal.

There is no detectable pollution of the air. And since public bodies of water aren't used, there's no danger of stream pollution.

At the Olds' plant, certain heat-treating and plating wastes are produced as free cyanide. Previously, these wastes were chemically treated to reduce the free cyanide to an acceptable toxicity level. Then the treated wastes were dumped in the river. But this costly disposal method left much to be desired.

Concrete Vault — Most of the new equipment is housed in an underground vault. This vault, made of reinforced concrete, has inside dimensions that measure 40 x 12 x 12 ft deep. Of course, the burner unit, exhaust stack and related piping are above ground.

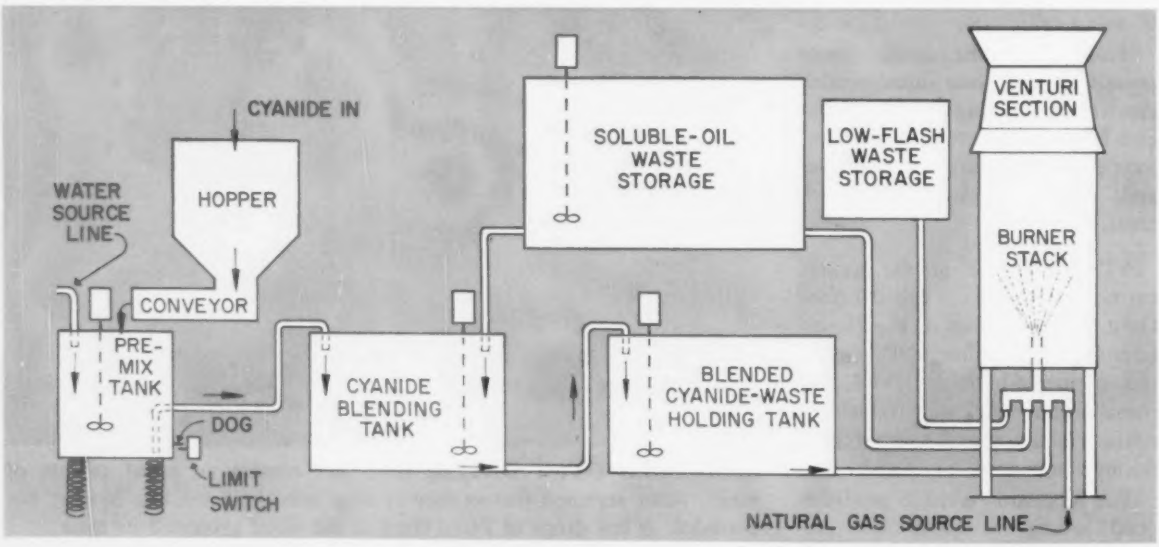
Truckloads of cyanide wastes are backed up a ramp to an opening in the vault. Through this opening, the wastes feed into a hopper. The hopper handles a 1400-lb working load.

A screw-type conveyor at the bottom of the hopper performs a dual role. It transports the waste to a pre-mix tank. As the waste moves through this conveyor, it's crushed into granule-sized pellets.

Built-in Controls—The pre-mix tank has a built-in weight controller. When the tank receives a 1200-lb waste load, a limit switch trips. This shuts off the conveyor.

In the pre-mix tank, 75 gal of water pours into each waste load.

System Burns All Cyanide Wastes at 2500°F



INTO THE VAULT: Gondola of cyanide wastes is spilled through an opening in the concrete vault. Hand hoist helps truck driver tip load.

A motor-driven mixer uses a pulverizing blade to form a slurry.

In slurry form, the mixture is pumped to a blending tank. In this tank, the waste slurry gets another additive. About 1200 gal of soluble oil enters the blending tank. Then a heavy-duty propeller agitates the final mixture.

The next stop for the blended mixture is a holding tank. As it enters this tank, the cyanide-waste mixture is ready for burning.

Other Waste Fluids—At Oldsmobile's request, the system was designed to permit flexibility in mixing and burning stages. Thus it's possible to dispose of various soluble-oil wastes and low-flash liquids. The latter liquids include spent paint thinners and waste gasoline.

The disposal system has three holding tanks for oil-blended cyanide slurries, soluble oils and low-flash wastes. A line to the burner can be opened to admit any of these waste fluids.

Without altering the burner's settings, the various wastes are rapidly consumed. The burner handles waste matter from any of the holding tanks. These tanks contain the cyanide soluble-oil blend, soluble oil alone and the low-flash waste fluids.

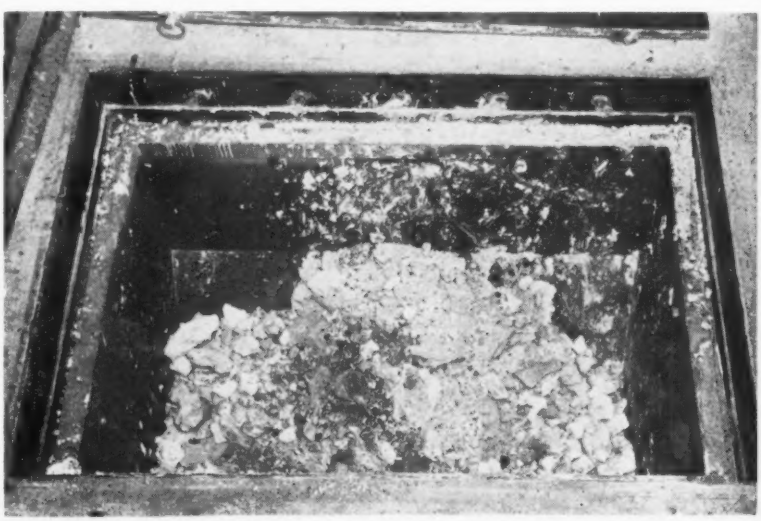
Complete Combustion—Let's run through the burning cycle. To start up a cold burner, a worker lights the gas-pilot flame. Then he energizes an ultra-violet flame detector.

Next, he heats up the burner with gas or low-flash fuel. The temperature builds up at a rate of 150°-200°F per hour until the burner registers about 2200°F. This is the heat at which incineration takes place.

The burner's temperature rises as the cyanide soluble-oil mix ignites. A temperature controller holds the heat within a few degrees at a maximum of 2500°F.

An air blower provides plenty of oxygen for complete combustion. In addition, the stack has a venturi section which induces extra air into the burner as the exhaust gases leave the stack.

At full-volume setting, the cyanide-waste mixture burns off at a rate of 150 gal per hour.



READY TO MIX: In the hopper, wastes await transfer via a crushing conveyor to a pre-mix tank. Water will turn the wastes into a slurry.

Does a Transfer Line Pay Off?

Well-Planned Line Turns Out 109 Subassemblies per Hour

By **Elmer Zarnke**—Applications Engineer, The Foote-Burt Co., Cleveland

An automatic transfer line is costly. Making the investment requires a big decision.

To be economical, it has to produce perfect parts unfailingly—year after year.

■ What makes a transfer line a good buy? For one thing, a transfer unit automatically carries parts between banks of closely-spaced machine tools. Then it positions each part at each work station. Also, fast feed-through and close-machine spacing mean high output.

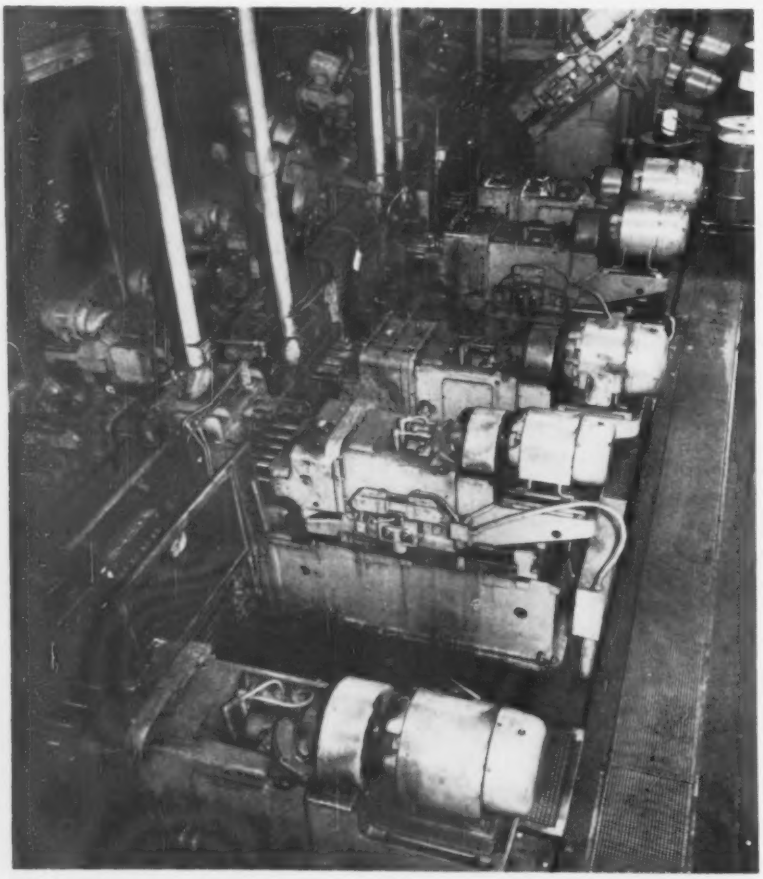
However, the initial investment is high. Automatic parts-handling machinery takes a large share of the total line cost. Despite low operating expenses, the transfer line must write off this high initial cost by faster production, better accuracy, and trouble-free continuous operation. Is it good economics?

Staying Power — Cleveland Engine Plant No. 1 of the Ford Motor Co. thought so. It was one of the first companies to install a large-scale continuous-process transfer complex for automobile components.

This line turns out 109 ready-to-assemble cylinder heads for V-8 truck and passenger engines every hour. It has been doing this for eight years. Let's take a look at the operation and see how it was built to last.

In a way, it's a "wonderful one-horse shay" proposition. For example, the rugged milling and drilling operation on the Ford head line puts heavier loads on its tools than the succeeding reaming and tapping operations. Nevertheless, these heavily-loaded machines must perform as faithfully as any others in the line. It's up to the machine builder to see that they do, year after year.

In this case, the 19-station tranfer line which performs all the heavy roughing operations was designed and built by The Foote-Burt Co., Cleveland, in close cooperation with Ford's engineers. Here's what it does.



HEAVY-DUTY LINE: Here's the 19-station transfer line that does a rugged job machining cylinder heads for Ford's Cleveland Engine Plant No. 1.

Plenty to Do—After broaching, the cylinder-head casting is tipped on its side at the first station of the 19-station line. This line performs the following operations: Heavy milling, drilling, surfacing and countersinking bolt and pushrod holes, rocker-arm bracket holes and oil holes. It also rough machines intake- and exhaust-valve holes.

The cylinder head continues through to other transfer machines where many of the holes are reamed, tapped, counter-bored and chamfered. Then it's on the way to washing and assembly operations.

No Shutdowns—Heads are re-

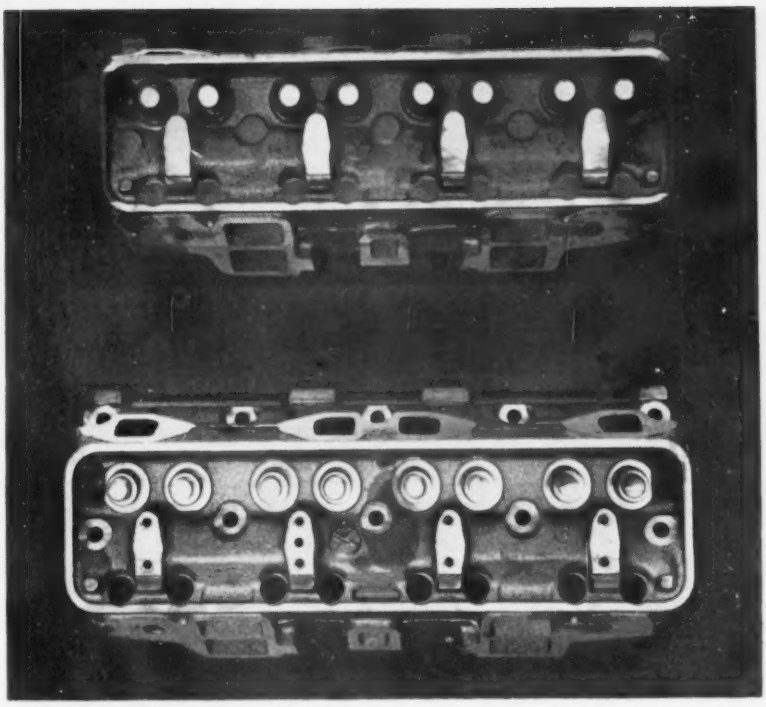
moved periodically for inspection at stations between major transfer-units. The space between each transfer machine allows temporary stockpiling of partially-completed heads during tool changes. In this way, the whole line never needs to be shut down.

Nearly all operations are performed by two-way machines with multiple-spindle heads. Fixed bushing plates locate tools accurately in relation to the workpiece. The entire line is hydraulically actuated. Now, let's see how the stations do their job.

First, a transfer bar moves the cylinder head to station one where it automatically locates and clamps. As the head moves into position, controlling microswitches trip, then machining begins.

At the second station, two 5-in. milling heads machine the cylinder-head ends to square them up with the mounting face. This provides locating pads for successive operations.

While the 20-tooth cutters move across the work, eight 15/32-in. drills produce holes 1¼-in. deep. Drill speed is 575 rpm; feed is 6 ipm. Two later operations plunge the drilled holes all the way through the head to a full 2½-in. depth.

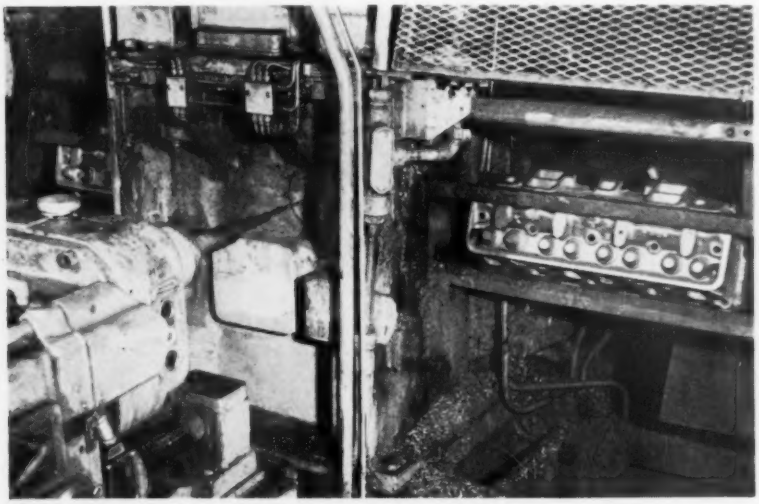


BEFORE AND AFTER: When broaching is completed, the cylinder head moves into transfer-line operations. After processing on the 19-station line (bottom), the holes are ready for reaming and tapping.

A Tough Job — Drilling these holes from the solid is one of the toughest and most-rugged operations on the cylinder head. To stand up under heavy machining like this, each of the machines travels on hard cylindrical ways instead of conventional square or vee ways. Polished to a 5-8 micro-inch finish, these ways are practically indestructible.

Because they're round, chips and debris cannot collect on the ways to interfere with drilling-head travel. Normal wear calls for occasional replacement of the bronze bushings which slide on the hardened ways.

Chips fall into a central conveyor. This conveyor travels beneath the entire transfer line. The chips wind up in an underground chip-disposal system which honeycombs the Ford plant. Ford was one of the first to have a completely-automatic chip disposal system.



DEPENDABLE DRILLING: This high-speed drilling operation produces a ½-in. hole at 1000 rpm. The station has maintained a 0.001-in. hole accuracy since the line was installed eight years ago.

Well Done—How does Ford feel about the line now? When demands for Ford truck engines went up, the engineers at Cleveland Engine Plant No. 1 solved the production problem in the simplest way. They ordered another transfer line identical to the first.

Delivery was speedy: Only six months, instead of the two years it took to build the first line. Now, both cylinder-head transfer lines vie for production records.

Shrink Fitting: A Six-Second Job

Air Heater Expands Odd-Shaped Parts For Assembly

By **O. C. McNairn,** Applications Engineer, Bryant Industrial Products Corp., Cleveland

Many jobs warrant a fast heating device set 'on line' to help out with part assembly.

Pressurized air heaters permit localized heating for quick shrink fitting. One company cycles an assembly in 6 seconds.

▪ Industry needs fast-heating setups for many jobs. Unfortunately most fast heating equipment suffers from one or more defects. Some units are bulky or costly. Others tie many parts in the heating process, or do not give precise temperature control.

However, a new principle based on the use of controlled high-pressure hot air promises to have a tremendous impact in industrial processing. The equipment is now being used in only a few places, but the heaters' potential is almost limitless. The pressurized air heater provides high velocity discharge of hot air at controlled temperatures.

Where it Fits—A few typical uses include heat sealing plastics, setting adhesives for metal to glass bonds, and making plastic to metal joints. The heater also generates inert gasses and supplies high pressure air at a controlled temperature for accelerated life tests of superchargers.

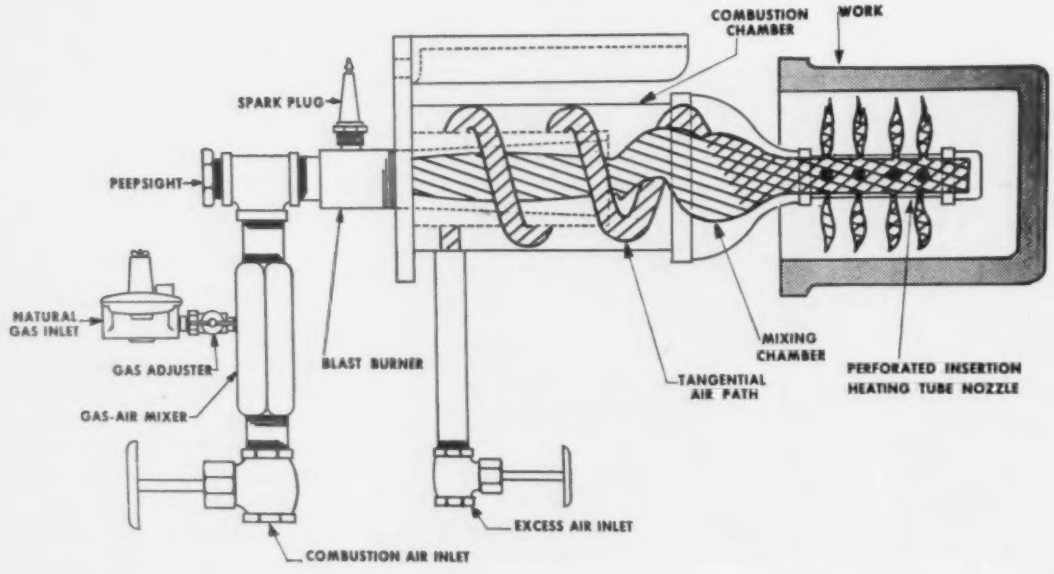
Thompson - Ramo - Wooldridge, Inc.'s Motor Equipment Mfg., Div., Cleveland, selected a pressurized air heater for heating parts that require shrink fits. The unit is so compact it can be installed right on the production line.

The heaters supply from 10,000 to over 1 million Btu per hour. More important, the heaters' design makes it possible to fire into pressurized combustion chambers.

The unit at Thompson has a discharge pressure of less than 1 lb. However, other designs provide pressures up to 20 lb. and even higher in special cases.

Why High Pressure Heat?—Quick part heating requires high

Single Valve Controls Heat Output



PRESSURIZED AIR HEATER

pressure to blow away the blanket of insulating air that surrounds the part. Where parts are symmetrical, relatively low pressures can do the job. Where parts are intricate the higher pressures must be called on.

The heater at Thompson provides air at a precisely-controlled temperature of 600°F. This pressurized air brings the parts up to temperature in just seconds. Tom Popson, factory manager of the Motor Equipment Mfg. Div., says: "Our new heating unit has proved to be an economical solution to a tough production problem."

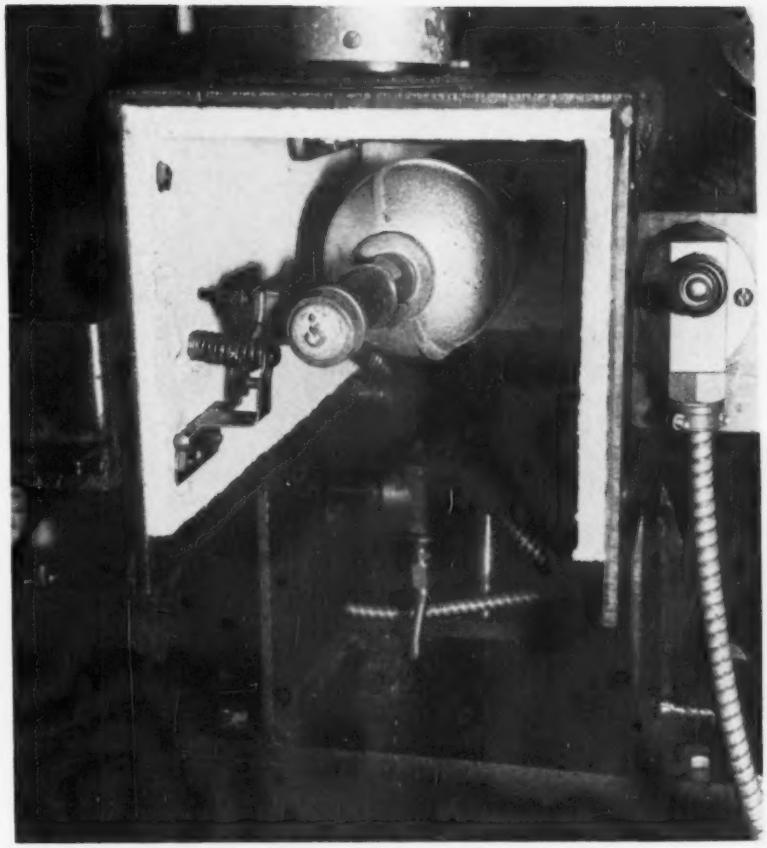
"Like many plants, we have jobs that require press fits. Occasionally we have jobs where we would like to use a press fit but can't because one or the other of the subassemblies has an odd shape. This makes a press fit impractical."

Solving the Problem—Thompson wants to expand parts quickly on a production line basis. Heating the parts by direct flame was ruled out for several reasons. Direct flame brings a fire hazard into the plant. Also direct flame might upset the metallurgy of the parts, since holding uniform temperature would be difficult.

Bryant Industrial's solution to this problem is both simple and direct. "Generate heat right where it's needed." When controlled temperatures and pressures are needed, the most reasonable solution is to fire into a pressurized chamber connected right to the use point. This method gives the high velocity air needed for fast heat transfer without the need for a fan.

The air heater is designed to save space. Inside the chamber is a flame tunnel that consists of a steel shell lined with a high-temperature castable refractory.

Excess air under pressure is blasted into the combustion chamber to cool the heat from the flame to the desired temperature. The unit's flame tunnel prevents the cold, excess air from impinging on the flame. By varying the amount of excess air, the temperature at the discharge point is varied from 100° to 3000°F.



HOT NOZZLE: Heat from combustion chamber flows through the many holes in the nozzle. Temperature can be set between 100°-3000°F.

Quick Example—Parts to be expanded are honed to 1.9754 + .010 in. The pressurized air heater expands the ID 0.0045 in. which allows an inner fitting part to be inserted easily.

The inside part's outer diameter ranges between 1.9763 and 1.9768 in. The outside part quickly shrinks holding the inner part in position. Fast, accurate heating completes this cycle in 6 seconds.

The design of the air-gas mixer shows how important the selection of components is to achieve efficiency. If Thompson desired to change from one part to another that required more heat, only one valve would need to be changed.

This is possible because the total heat input of the mixture delivered to the burner system is controlled by a single valve in the combustion air line. Air passing through the mixer produces a suction in the throat section to entrain the gas.

After the air and gas are mixed, the flow passes to a blast burner made of a heat resistant alloy. The burner gives a high velocity short flame.

A spark plug ignites the flame when the circuit is closed. In the Thompson installation, the solenoid valves that operate the gas and air valves are in the same circuit as the spark plug. Thus there is no chance of gas build up or explosion.

Mr. Edmund Wercion, tool and design engineer at Thompson, points out that fast heating a localized area ends the need for total part heatup. Equally important, controlled heating eliminates the need for part cooling areas thus saving valuable space.

BREAKING DOWN: The magnesium ingot is placed in the hot-galvanizing bath. Upon contact with the zinc the magnesium reacts. The two metals then form a new bath alloy, 50 pct magnesium and 50 pct zinc.

Galvanized Panels Improved By Magnesium Additions

Better protection of parts is possible by adding small amounts of magnesium to the hot-dip galvanizing bath.

Results of a six-year exposure test offer proof.

■ Many studies are looking into improved coatings for steel through hot-dip galvanizing. At the Dow Chemical Co.'s Freeport, Tex., Texas division, there's good reason to keep posted on developments in this field. Each year between 6000-10,000 tons of galvanizing is used to protect this plant from corrosion.

For the past decade many metals have been added to the conventional galvanizing bath in an effort to improve the corrosion resistance of the coating itself. The main metal involved has been magnesium.

It was only natural that Dow Chemical Co. would be interested in magnesium as a metal addition. Nevertheless, the results look very promising indeed.

About six years ago steel panels were placed on exposure racks. Included in the many sites for these racks were rural, marine, industrial-marine and even salt-water immersion. Tests in salt spray and 100 pct humidity were also included. The main point was that each panel had been galvanized in a bath that contained 0.014-0.030 pct Mg.

Less Corrosion—The results conclude strongly that magnesium greatly improves corrosion resistance of the coating. Also, in the correct proportions, magnesium improves the appearance of the coating. There are no harmful effects on the mechanical properties of the coating.

Magnesium can be added to the bath with ease. There's no problem maintaining it in the bath. Such areas as drainage and icicle formation are eased, too. Its higher cost is more than offset by the many benefits.

The effect of this addition is borne out in the first graph. Note how quickly the zinc coating improves when the magnesium content passes the 0.014 pct level. The improvement reaches its greatest heights as soon as the magnesium concentrate falls between 0.04-0.05

pct. Here the improvement is about 50 pct.

Big Improvement — The data shown in the first graph represent mean improvements. Certain panels displayed 90 pct improvement over conventional baths. The poorest improvement, on the other hand, was no worse than 20 pct.

What effect does magnesium have on the mechanical properties of the coatings? As far as ductility is concerned, there is little change. Like cadmium, lead and iron, magnesium does exert a hardening effect on the outer layer. But Dow's tests prove that such a coating fractures under equal or slightly more bending stress than those without magnesium.

How do you keep magnesium content in the bath within the 0.04-0.05 pct range? Throw this question at five different galvanizers and you'll probably get five different answers.

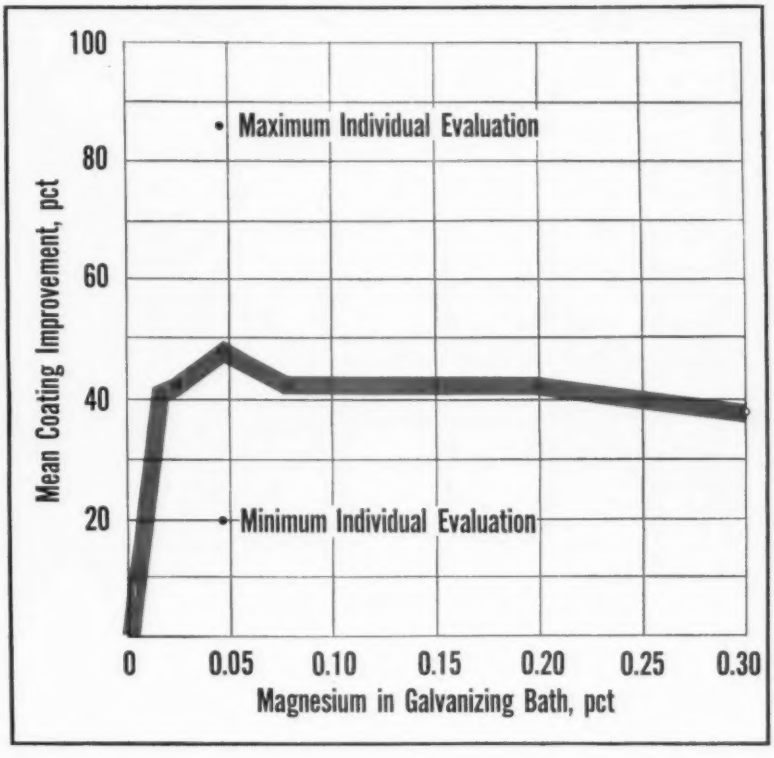
Common Sense—At the Texas Division, the kettle with magnesium in it has been in use for over a year. During most of this time, the kettle operators were the ones who have decided the time to add magnesium. Sample checks of the bath usually reveal that the operators are in the right groove, too.

Past experience has set up several rules of thumb which make the whole operation much simpler to perform. For one thing, don't add too much magnesium at one time. For instance, if your pot holds 200,000 lb of zinc, only add 40 lb of magnesium at a crack. This amounts to a theoretical 0.02 pct addition.

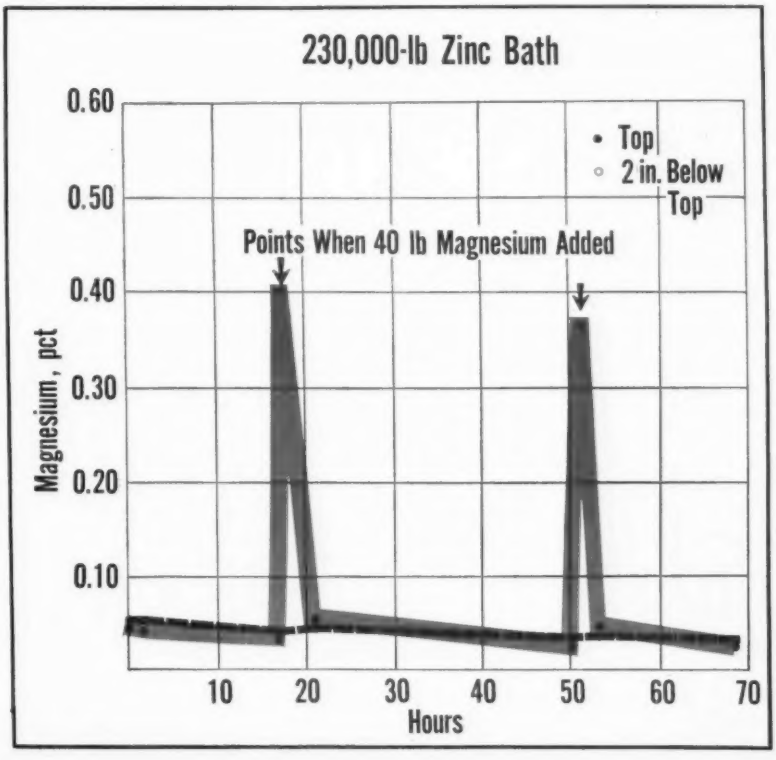
If the magnesium content is too low, the work will tend to drain poorly. On the other hand, there are two clues in determining when the content of magnesium is too high. First of all, the flux will start to get gummy. Also, oxidation will increase noticeably once the concentration exceeds 0.05 pct.

Aluminum Limits — Aluminum content points up similar evidence. If there is too little, oxide problems

Ups Corrosion Resistance



When to Add More Magnesium



occur and the work looks dull. If too much is added, flux problems are presented. In either case, however, a routine can be established for both metals after a short time.

At the Texas Div., the kettle operator just knows he must add so much every so often. Aluminum, of course, is added daily.

Like Satin — In appearance, a magnesium-zinc coating can be described as "satin-white silver." Of course, such a surface depends upon the amount of aluminum in the bath. As a result, the proper amounts of aluminum and magnesium team up to produce a better looking, smoother coating than either metal can produce alone.

Ideal coatings are produced with a magnesium content of 0.03-0.05 pct and an aluminum content of 0.003-0.005 pct. If your only interest is looks, you can raise the magnesium content to 0.01 pct and increase the amount of aluminum accordingly.

The surface of a bath containing these two metals oxidizes rapidly. It then forms a thin, elastic, transparent film. This film isn't visible on the work surface except in areas where it becomes wrinkled prior to solidification. Even then, you have to view the surface from an angle before these areas are apparent.

Spangle Formation — In many cases spangle formation is an important factor in surface appearance. The effects of cooling rate, surface roughness and the presence of other metals make an accurate prediction of magnesium spangling impossible.

Magnesium is a strongly crystalline metal. In fact, it's so strong that magnesium ingots sometimes have single crystals extending the entire ingot length. The metal has a much higher melting point than zinc. Magnesium and zinc form a eutectic containing about 97 pct Zn and 3 pct Mg that solidifies at 687°F.

In general, these facts indicate that magnesium forms a very strong spangle, slightly smaller than that found in lead. At magnesium concentrations of 0.09 pct or less, the effects of the other metals involved nullify the effects of magnesium to a great extent.

Effects on Galvanizing—The first problem is adding the magnesium to the galvanizing bath. Since magnesium melts at about 1200°F it will not melt directly into the bath. However, there are two practical ways to make the addition.

Zinc-magnesium alloys containing less than 5-pct Mg can be added to the bath. This is the simplest way. An almost equally simple method has been developed for adding ingot magnesium.

When magnesium ingot is added, the first step is to clean the ingot by pickling. Abrasive methods won't do the job. Several acids will handle the problem. These include sulphuric, hydrochloric, acetic, phosphoric, nitric and chromic acids. The concentration should be kept very low since magnesium is very reactive in strong acids. A 10 pct sulphuric solution cleans an ingot in less than one minute.

Ready to Go—The cleaned magnesium is placed in the bath. Upon contact with the zinc a reaction takes place and the two metals form a 50-50 alloy. The alloy is molten at the galvanizing-bath temperature. To stop the reaction and hold the proper alloy ratio, the mass should be swept through the bath with a flux paddle. If it's not, the alloy will resolidify.

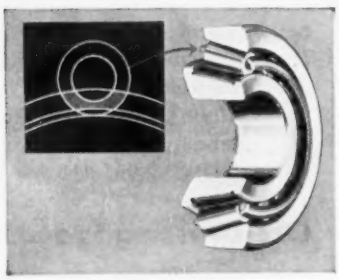
A piece of resolidified material, about 4-in. diam and 1-in. thick, requires about an hour to dissolve.

CHECKS RESULTS: Zinc-industry representatives inspect a test rack at one of four sites where Dow has been evaluating magnesium as an additive for hot-dip galvanizing. The results are very promising.

Reprints of this article are available as long as the supply lasts. Write Reader Service, The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

Ask for Reprint **No. 181**

Bearings "keep cool" under hot steel!



HIGHER FLANGE IMPROVES ROLLER ALIGNMENT

As shown by the gray area above, the higher flange provides a large two-zone contact area for the roller heads. This greatly reduces wear—practically eliminates "end play". Larger oil groove provides positive lubrication.

Watch it! Coming down the line—another half-formed slab of red-hot steel! And with it comes a supreme test of bearing excellence. Bower Bearings are equal to it—helping to keep this mill operating smoothly and continually despite heavy loads and extreme temperature. Whatever the job, there's a Bower Bearing engineered to perform just as dependably when the going is toughest. Rigid quality controls and basic bearing design refinements like those shown at the left have reduced Bower Bearing failure to a practical minimum. If your product uses bearings, specify Bower! There's a complete line of tapered, straight or journal roller bearings for every field of transportation and industry.

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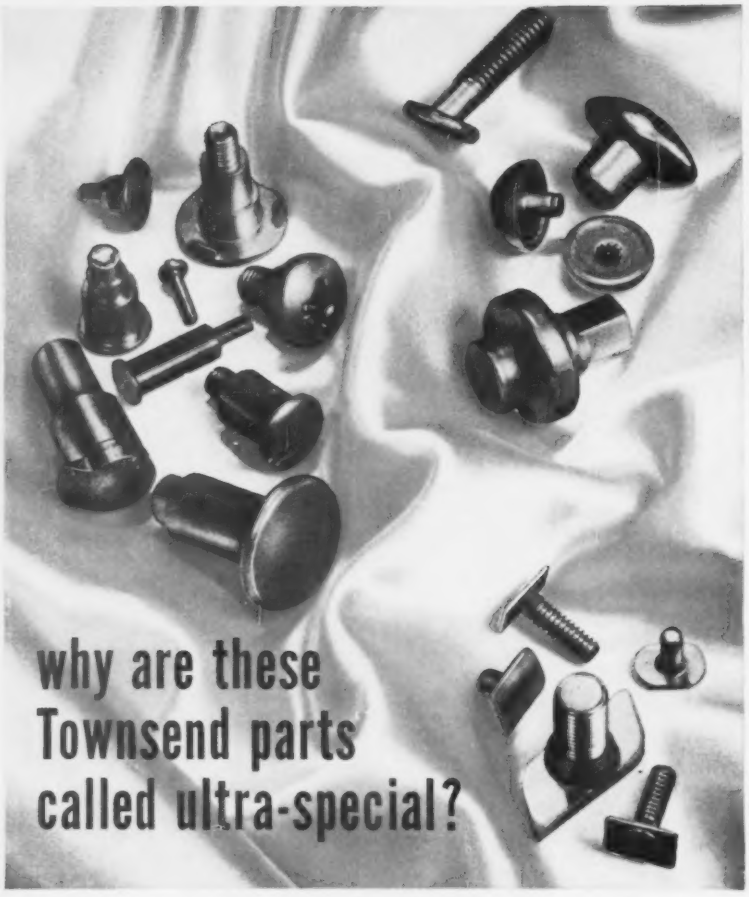

We call the metal parts shown here Ultra-Special because they are the result of completely new cold-forming and finishing techniques. They are typical examples of how users are reducing costs by taking advantage of the strength, improved quality, close dimensions and economy of mass-producing parts by cold-forming.

In the past, the limitations of the cold-forming process forced manufacturers to accept parts which were made by other, more costly methods. Now, through extensive research and development work Townsend is cold-forming Ultra-Special items with intricate shapes and critical dimensions held to tolerances as close as .001 inch. They may be made by combining cold-heading processes with impact extrusions, special heat-treatment and coatings, to name but one of the new techniques.

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NEW PATENTS

Forming-Wheel Alloy

High-temperature nickel-iron base alloy, R. H. Thielemann (assigned to Sierra Metals Corp.), Apr. 25, 1961. An austenitic alloy suitable for forming wheels for gas or steam turbines comprises 10-20 pct Cr, 18-50 pct Ni, 1.5-8 pct W, 1-5 pct Cb and/or Ta, 2-4 pct Ti, 0.05-0.25 pct C, and the balance essentially all Fe. U. S. 2,981,621.

Compounds Sinter Feed

Method and apparatus for compounding sinter feed, T. R. Schuerger (assigned to U. S. Steel Corp), Apr. 18, 1961. This design for an improved iron-ore, sinter-feed compounding apparatus and method takes into account hot-recycle variations in proportioning the other ingredients. The location of the hot recycle bin is of no consequence. U. S. 2,980,291.

Prevents Leakage Flow

Means for preventing waste-preferential air flow at side walls of sintering machine pallets, R. C. McDowell and T. E. Ban (assigned to McDowell & Co., Inc.), Apr. 25, 1961. To prevent leakage flow along the vertical side walls of iron-ore, sintering-machine pallets in Dwight-Lloyd machines, ribs or cleats are installed. These bridge the gap formed by the shrinking of the sinter-cake bed and stop the leakage. U. S. 2,981,532.

Ore-Dressing Process

Process for dressing ores, O. Moklebust (assigned to R-N Corp), Apr. 18, 1961. In a process for dressing hematite or other "soft" iron-oxide ores, the ore is crushed, pugged in a high-solids water suspension, and the iron-containing pulp separated from the granular siliceous gangue. U. S. 2,980,346.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Tubing-Buyers Guide

Principal characteristics, size range and relative cost of carbon- and alloy-steel tubing for mechanical, structural and hydraulic applications are set forth in easy-to-compare style in the Guide. It also covers stainless steel, aluminum and industrial-plastic tubing. Tips on when to use tubing instead of bar stock round out the data. (Joseph T. Ryerson & Son, Inc.)

For free copy circle No. 1 on postcard

Welding Design

"Recommended Practices for Automotive Welding Design" is the title of a new publication just issued by the American Welding Society. The manual contains 48 pages, and a chart of AWS Standard Welding Symbols. The material was compiled by a committee of experts, drawn from all major automobile manufacturers and related industries.

For free copy circle No. 2 on postcard

Hydraulic Cylinders

A series of medium-pressure hydraulic cylinders receive full treatment in a new, 20-page, full-color catalog. At up to 2000 psi, the cylinders meet or exceed JIC standards. (The Sheffer Corp.)

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Safety Enamels

A technical bulletin tells all about a new line of safety enamels. The enamels furnish a tough, flexible-adhesive film when baked at conventional baking cycles. Gloss and color are comparable to conventional solvent systems. But, since water is the only solvent used, there's no fire hazard. (U. S. Paint Co.)

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Temperature Unlimited

This 240-page catalog illustrates and describes a complete line of temperature equipment. Items in the booklet include electric ovens, furnaces, baths, environmental cabinets, related temperature-control equipment and accessories for laboratory, pilot plant and production. In addition, the multi-color catalog incorporates a 16-page technical section to supplement the catalog descriptions. (Blue M Electric Co.)

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About Precision

Solutions to problems in locating, boring, grinding and measuring holes, when tight tolerances must be held, are suggested in a 2-color brochure. It outlines equipment and methods to deal with these problems. (Moore Special Tool Co., Inc.)

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Handles Machine Waste

Tubular conveyor systems can solve the machining-chip problem. A new data package includes a wealth of material to aid you in modernizing your chip-removal setup. It discusses actual case histories pointing up the benefits of efficient chip removal. (Hapman Corp.)

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Compressor Valves

The operation and importance of valves in modern reciprocating compressors are dealt with in a new 44-page booklet. It details the demands made on valves and their function in a compressor. It also traces the evolution of valving from the mechanically-operated intake valves and the heavy-poppet dis-

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FREE LITERATURE

charge valves of the 19th century to modern, high-speed, air-cushioned valves. (Ingersoll-Rand Co.)

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Chemical Catalog

Several hundred new items are listed in a large catalog, including recently-developed chemicals for gas-liquid chromotography. In addition, the pages contain over 5000 listings of laboratory organics, inorganic reagents and stains and indicators. (Matheson, Coleman & Bell)

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Patching, Ramming Mix

Information on an improved basic patching and ramming mix for use in open-hearth steel furnaces is now available in a new folder. It gives data on cold-crushing strengths and product analysis, including physical and chemical composition. It also presents a brief description of installation methods. (Kaiser Aluminum & Chemical Corp.)

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Turret-Drill Machines

In 16 pages, a new bulletin passes along descriptions and specifications on 10 tape-controlled systems available with a line of turret drills. Also, four pages of case histories point out the benefits. (Burgmaster Corp.)

For free copy circle No. 11 on postcard

Detects Temperatures

A pocket-size brochure tells all about a line of temperature-detecting crayons and paints. These items have the ability to change their original color when certain temperatures are reached. These changes are not slight color alterations, but a distinct change to a completely different color. (Princeton Div., Curtiss-Wright Corp.)

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Ceramic-to-Metal

Here's a bulletin from a new entry in the ceramics field. The literature describes a contamination-free facility and advanced production methods used in the production of high - temperature ceramic - to - metal products. Also outlined are characteristics and quality standards of basic products, such as terminal insulators and ceramic-to-metal seals. (Ceramics International Corp.)

For free copy circle No. 13 on postcard

Endothermic Generator

An endothermic generator that produces a low-cost protective atmosphere for bright hardening, bright brazing or bright annealing steel is the subject of a new data sheet. (Gas Process Div., Lindburg Engineering Co.)

For free copy circle No. 14 on postcard

Maintenance Materials

Including 75 products with over 30 illustrations, a new catalog presents all the dope on a line of industrial maintenance materials. It lists products for industrial floor and roof repair, machinery anchoring and grouting, and electric-motor cleaning. (Ranco Industrial Products Corp.)

For free copy circle No. 15 on postcard

Area Floodlighting

Quick reference guides for selecting incandescent or mercury floodlights, general-purpose or heavy-duty types, are given in a new bulletin which also tells how to determine how many floodlights are needed, based on the size of the area requiring lighting. Planning the lighting for open areas can be done with ease, using this guide. (Crouse-Hinds Co.)

For free copy circle No. 16 on postcard

Copper-Lithium System

An annotated bibliography lists abstracts of all published literature dealing with the copper-lithium system. These abstracts are arranged in chronological order. In addition, an index gives handy reference to such subjects as physical and chemical properties, uses, analysis, preparation and the standard phase diagram. (Foote Mineral Co.)

For free copy circle No. 17 on postcard

Machine-Tool Articles

A corporation is preparing a series of articles on dial-type machines and tooling applications for these machines. The series will consist of 8 articles covering: The basic machine, slide cams, spindle equipment, workholding fixtures, transfer mechanisms, and additional information on tooling. The first of these, on the basic machine, is now available. (The Bodine Corp.)

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Stop looking for spring wire in large coils...it's here (*courtesy of Roebling*)

This is really an enormous availability—3000 pounds of high carbon spring wire in a single, nonstop coil. You know what this means. Uninterrupted productivity. You make more of your products faster and, as with *any* length of Roebling spring wire, you make them better.

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For information on this ready abundance and on new Roebling Springkote, write Roebling's Wire and Cold Rolled Steel Products Division, Trenton 2, N. J.

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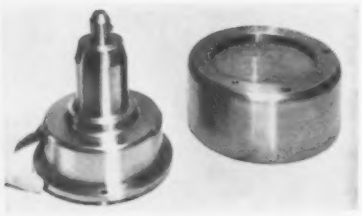
New Materials and Components



Spindle Adapter Speeds Up Duplicating Machines

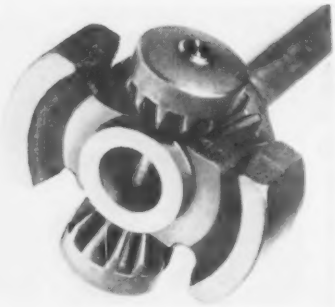
This new adapter triples the spindle speeds of large vertical duplicating machines. On machines that are usually limited to 1000 rpm, the 3 to 1 boost adds to their versatility. For instance, there's no need to transfer workpieces to smaller machines for fine, small-diameter cuts. The adapter installs in minutes. Transfering the workpiece took hours. (Permanent Mold Die Co.)

For more data circle No. 19 on postcard, p. 105

Pneumatics Direct a Numerical-Control System

Here's a new approach to low-cost numerical control—a tape-reading system based on pneumatic-hydraulic principles. Advantages claimed are the design simplicity, easy upkeep, fast operation and accuracy. For instance, the table travels at 350-700 ipm. In point-to-point positioning, accuracy is ±0.0005 in. The system gives this performance on new machines, or with existing drilling, tapping and boring units. In operation, the steps resemble those of its electronic counterparts. However, the means are different. Briefly, a pneumatic tape reader scans instructions from a standard 8-channel punched tape. Signal air pressures from the reader, position two decoder switch-plate sets on each of two actuaters. These actuaters select valves which control the hydraulic servo mechanism. Then this servo positions the work table. (Moog Servocontrols, Inc.)

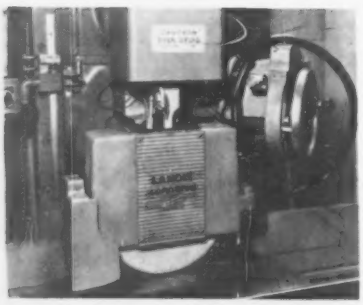
For more data circle No. 20 on postcard, p. 105



Infiltrated Iron Slashes Cost of Differentials

Huge savings, along with high-strength characteristics, prompted the Indus Corp. to switch to Oilite differential gears in its varied line of products. Originally, the gears were machined from 1045 steel for necessary strength. But copper-infiltrated iron duplicates this strength. At the same time, machining costs tumble. So much so, that a 75-pct saving on the bevel gear and an 87-pct saving on the pinion is possible. The Oilite process is an application of powder metallurgy. Here's a good example of the strides this technique is making. (Amplex Div., Chrysler Corp.)

For more data circle No. 21 on postcard, p. 105



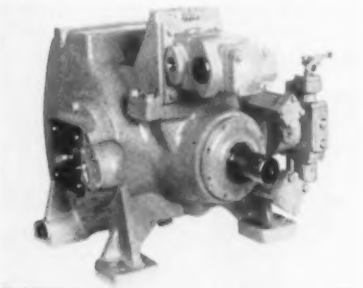
Ultrasonic Accessory Boosts Grinding-Wheel Life

When metallic debris builds up between the abrasive particles on a grinding wheel, proper cutting action is impossible. However, a new attachment fights this unwanted "loading" situation. It uses ultrasonic energy in the 20,000-cps range to prevent the build up. In effect, a powerful force field at the wheel surface inhibits the "loading" condition. Production-run studies show its use cuts wheel-dressing down-time and extends wheel life. It also holds burning and work deformation to a minimum. This means flatter work, more accuracy and finer finishes. (Cavitron Corp.)

For more data circle No. 22 on postcard, p. 105

Pumps and Motors

Here's a new line of angle-type piston pumps and motors rated for pressures to 5000 psi. A wide variety of controls, instant response to the controlling signal, and reversible flow suit the units for almost any application requiring high pressures and flows. Just a partial list includes forming and extrusion presses, cargo winches, planer drives and log carriages. The newcomers are available as either pumps or motors, with fixed or variable displacement. With servo control, the variable-displacement pump strokes from maximum displacement in one direction to full opposite in about ½ second. Thus,



the output flow exactly follows the controlling signal. (Vickers Inc., a div. of Sperry Rand Corp.)

For more data circle No. 23 on postcard, p. 105

Oxide-Removing Dip

To improve electroplating on to copper and copper-alloy printed circuits, a new formulation removes oxides, light soils, and similar plating deterrents through a simple dipping operation. It cleans without affecting plating resists, or etching copper circuits. This promotes reject-free production in subsequent electroplating operations. Packaged in a polyethylene container, it pours easily to mix with equal parts of water in a processing vessel. (The Meaker Co.)

For more data circle No. 24 on postcard, p. 105

Heats Immersion Tubes

Designed for mounting on and firing into an immersion tube, a new gas burner disperses the heat uniformly over the entire length of the tube. It's available in three sizes, 6, 8 and 10 in., with the capacities of 800,000, 1,500,000 and 2,500,000 Btu per hr respectively. Remarkably compact, each unit has a

directly-connected motor, blower, built-in air- and gas-control valves, and a flame rod and spark electrode. The low-pressure radial fan and fully-enclosed flame ensure a low noise level. (Maxon Premix Burner Co.)

For more data circle No. 25 on postcard, p. 105

Auxiliary Transmission

Boasting quiet operation and easy shifting in all gear positions, a new 4-speed auxiliary transmission has a nominal torque rating of 550-600 ft-lb, but weighs only 340 lb. It's designed for use with standard 4- or 5-speed transmissions in the 400-600 ft-lb range. Also, a top-mounted power take-off is avail-

able to operators of heavy-duty winches, pumps and other vehicle-mounted, materials-handling devices requiring full engine torque. (Dana Corp.)

For more data circle No. 26 on postcard, p. 105

Tiny Vacuum Control

With several adjustable ranges, a sensitive pressure-vacuum control

THE FREEDOM DIMENSION

. . . saves 35 machining operations

This target revolver barrel is now being made by the new Hitchiner Ceramic Shell technique of investment casting. *Thirty-five* machining operations are eliminated! The only external finishing required is partial polishing.

Investment casting may provide many benefits for you . . . choice of alloy . . . flexibility of design . . . improved parts performance . . . reduction of costs. Maybe one of your parts can be made better for less.

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Milford 3, New Hampshire

Fast Delivery on Custom Requirements

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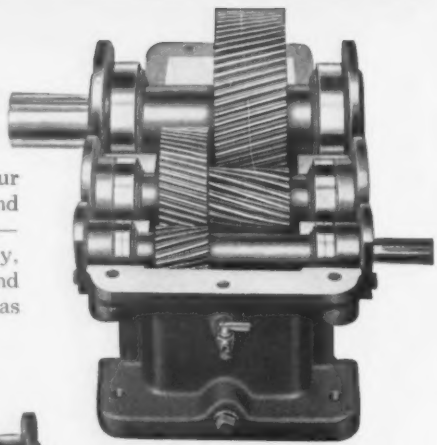
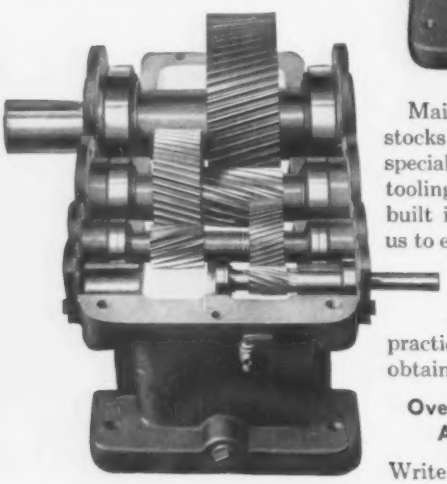
Single · Double · Triple Reduction

You get *fast action* when you come to Horsburgh & Scott with your speed reducer and gearing problems.

We are able to meet your specifications—or design and build to your specific needs—products of highest quality, backed by the experience and reputation of many years as leaders in the gearing field.





Maintaining one of the largest stocks of patterns and blanks . . . special equipment and special tooling—much of it designed and built in our own plant—enables us to engineer and produce a wide range of custom gearing and transmission requirements, economically and practically as fast as you can obtain them from stock sources.

Overall design conforms to AGMA specifications

Write for details on wide size and capacity range of H&S Speed Reducers—Helical, Herringbone, Worm Gear and combinations.

H&S The HORSBURGH & SCOTT CO.

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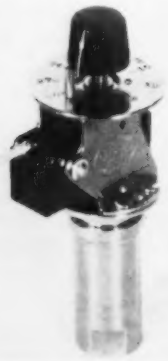
Specializing in fast production of quality Speed Reducers and Gearing to meet custom requirements.

suits many applications such as centrifuges, welding equipment, panel-boards and process-control

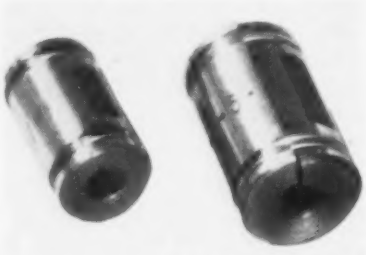


equipment. The unit combines high sensitivity, small size and low cost. For direct use in other equipment, it's designed without an enclosure. In addition, the controls have several adjustable ranges within limits of 30-in. hg vacuum and 500 psi. On-off differentials range from 1.5±½ in. hg to 10±3 psi. For further versatility, switch action includes normally open, closed and double throw. (United Electric Controls Co.)

For more data circle No. 27 on postcard, p. 105

Drill-Holder Bushings

A new line of low-cost split bushings fits all screw-machine drill holders and floating holders. Advanced design allows the bushing to grip the tool around three-quarters of its circumference for more accurate fitting and line-up. There's no tool slippage or distortion be-



cause the bushings hold the tool tighter with less clamping pressure. Even though the segment retaining rings prevent any accidental pulling apart, it's still easy to insert or remove a tool from the bushing. The

line is made of quality carburizing steel, which is ground after heat treating. Sizes include all letter, number and fractional drill sizes from #80 to 63/64 in. (Mueller Industries.)

For more data circle No. 28 on postcard, p. 105

Cryogenic Valves

Extended-bonnet, stainless-steel valves for liquid oxygen and other cryogenic applications are now available virtually "off the shelf." The standard line includes the most-used styles of gate and globe valves, in sizes from 1-8 in. Any practical length of extended bonnet can be specified. This feature cuts down on heat transfer and locates the packing gland outside the cold box. General material is AISI Type 304

stainless steel, but other materials are available. (Cooper Alloy Corp., Valve & Fitting Div.)

For more data circle No. 29 on postcard, p. 105

Glass-Epoxy Laminate

A new glass-base, epoxy-resin laminated plastic is self extinguishing. There's also high mechanical strength, good electrical properties under severe humidity conditions, and low moisture absorption. It resists chemicals. For making printed circuits, it's available with copper cladding. Normally, it comes in natural-color sheets in thicknesses from 0.010-2 in. (Taylor Fibre Co.)

For more data circle No. 30 on postcard, p. 105

Cures at Low Pressures

An adhesive that cures at low pressures for metal-to-metal bonding has recently been developed. It's

$50,000,000

Armco Steel Corporation

ARMCO

Twenty-Five Year 4½% Sinking Fund Debentures Due 1986

Dated June 1, 1961 — Due June 1, 1986

Price 99¼%

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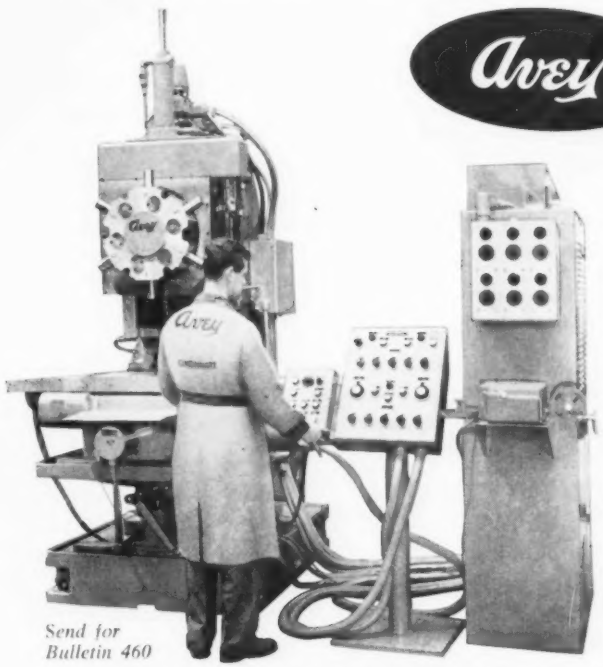
May 23, 1961

6 precision spindles by

Avey



Send for Bulletin 460

You can get this rugged Avey 250 Turret-Dex with either automatic or numerical controls. Rotary, 2- or 3-axis positioning. Pre-selected speeds, feeds, rapid advance, tapping cycles. Automatic depth control all spindles; automatic turret clamp; positive spindle stop; skip index. Capacity to 1¼". Eight spindles optional. Avey, Box 1264, Cincinnati 1, Ohio.

a high-strength, thermosetting film. With its use, there's no need for elaborate (and expensive) jigs and fixtures to apply pressure. Thus, the new adhesive fits in nicely with production-bonding operations. When properly cured, it has excellent resistance to vibration and shock. It also resists oil, water, fuels and salt spray. Metal-to-metal shear strengths of 4700 psi at 75° F and over 4000 psi at 180° F can be expected. (Minnesota Mining & Mfg. Co.)

For more data circle No. 31 on postcard, p. 105

Aluminum Alloy

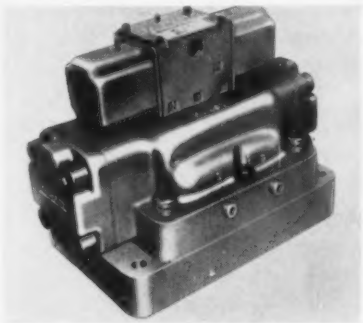
A new alloy broadens the use of aluminum castings. It's a high-strength, shock-resistant casting alloy, developed for use where high yield strength and low elongation are needed. The alloy comes in two grades, to accommodate different conditions. One, as-cast and fully-aged, has a yield strength of 36,000 psi with some shock resistance. So-

lution heat treated and aged in the T6 condition, it boasts a yield strength well over 40,000 psi and over 5-pct elongation. The other has an as-cast, fully-aged yield strength of 32,000 psi. At the same time, it has 7-pct elongation. Thus, it combines strength with great shock resistance. (William F. Jobbins, Inc.)

For more data circle No. 32 on postcard, p. 105

Four-Way Valves

Rated at operating pressures to 5000 psi, a new 1½ in., 4-way valve operates by manual, mechanical or electrical means. The unit comes with thread, subplate or flange connections. Five different spools provide for open, closed or partially-blocked, flow-path connections. These connections handle



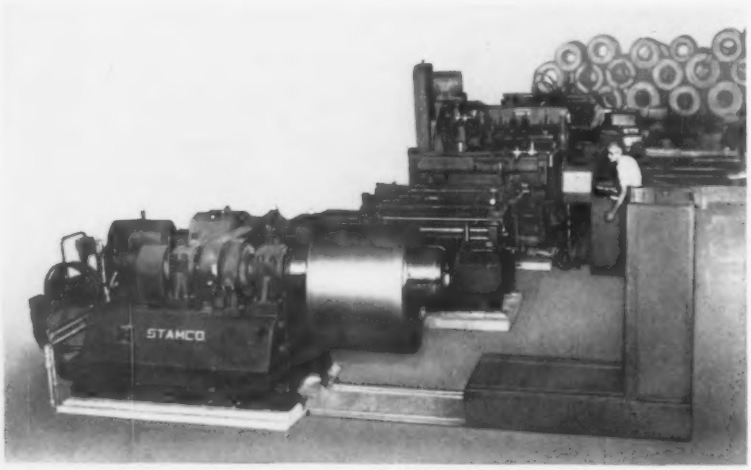
flows up to 90 gpm. (Denison Engineering Div., American Brake Shoe Co.)

For more data circle No. 33 on postcard, p. 105

Improves Emulsions

More tackiness in less time results from the use of a new additive to polyvinyl acetate emulsions. The product is a polyoxyethylated, aro-

Stamco equipment
handles coils up to 72 inches wide
... reduces operating costs



Designed and built for greater capacities, this new Stamco shear line will accommodate stock up to 14 gauge, in widths to 72 inches. It handles coils weighing a maximum of 20,000 pounds. Accuracy can be held to plus or minus 1/32 inch. Lengths can be cut from 14 inches minimum to any maximum length.

Stamco, Inc.
New Bremen, Ohio, U.S.A.

Slitting and Coiling Lines • Cut-to-Length Lines • Flying Shear Lines • Power Squaring Shears • Continuous Process Lines
Ferrous and Non-ferrous Mill Equipment

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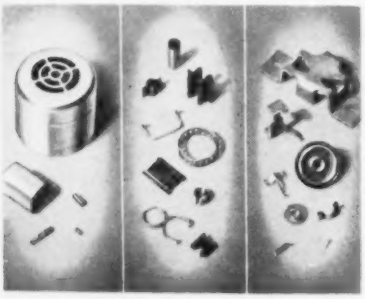
W. H. Millan, 11955 Shaker Boulevard, Cleveland 20, Ohio

matic, colorless liquid. It serves as a partial replacement for the normal plasticizer and increases the ultimate bond strength of adhesives over a period of three or four days. (Nopco Chemical Co.)

For more data circle No. 34 on postcard, p. 105

Extends Size Range

Deep-drawn parts up to 8-in. diam, stampings up to 12-in. wide, and wire and strip parts made on multi-slide machines, are recent additions to a manufacturer's line. This represents a considerable extension in the size range of precision stampings and deep-drawn parts previously offered. They come in a variety of metals, including



titanium, molybdenum, tungsten, stainless and carbon steel, brass, copper, aluminum, nickel and other alloys. The expanded product line results from the acquisition of new production facilities. (Johnson & Hoffman Mfg. Corp.)

For more data circle No. 35 on postcard, p. 105

Counts Components

Electronic counting devices can be designed into original equipment or adapted to existing equipment to supplement, and in some cases replace, expensive control systems. These units keep tabs on production and speed up materials handling. The line includes two simple general-purpose photoelectric counters, surprisingly low in cost. (Veeder-Root Inc.)

For more data circle No. 36 on postcard, p. 105

Ball-Bearing Nut

For ball-bearing screw assemblies, a new small diameter nut solves limited space problems. In some cases, it eliminates the need for the conventional return tube. On a typical screw assembly with a ball circle diameter of 3/16 in., the newcomer's reduced OD was 20-pct less than the previous nut—from 0.500 in. to 0.400 in. (Saginaw Steering Gear Div., General Motors Corp.)

For more data circle No. 37 on postcard, p. 105

Takes Heavy Loads

Built to absorb heavy loads and severe impacts in industrial applications, a sturdy, roller-bearing pillow block features all-steel construction. It's available for shafts from 1 7/16 to 9 9/16 in., inclusive. Advanced design features are responsible for its long dependable service. For instance, rotating triple seals protect the bearing against foreign matter, while retaining lubricant. Elongated bolt holes permit easy horizontal alignment. Also, you can apply oil or grease directly to the rolling elements. (SKF Industries, Inc.)

For more data circle No. 38 on postcard, p. 105

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in Alloys • Stainless • Carbon • Bronze

Experienced hands . . . expert hands . . . hands grown competent by 45 years of the finest precision work. These are the hands of our specialists who meet your design and engineering specifications. Special Erie fasteners to meet the rigors of extreme temperatures, corrosion, tensile stresses are serving widely diverse industries the world over. Send your specifications to us, confident of the finished precision fasteners you expect.

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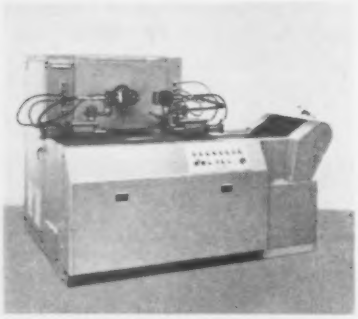
New Equipment and Machinery



Flame Machine Features "Building-Block" Concept

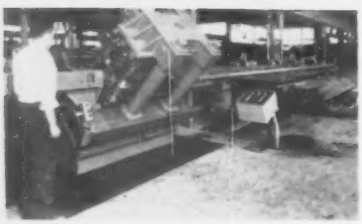
Various standard "building-block" units assemble into a flame-heating machine that suits specific applications. To do this, a series of basket-type and conveyor-type quench tanks team up with standard flame-heating units. These heating units precisely control fuel gas, oxygen, air, water and primary electric power. In addition, there's a wide range of accessory equipment such as electronic temperature control and rotary flame heads, plus automatic work-handling fixtures. The self-contained quench tanks boast automatic circulation of the quench medium, a heat exchanger and a motorized conveyor. (Cincinnati Milling Machine Co.)

For more data circle No. 39 on postcard, p. 105

Machine Presets Tools, Shrinks Idle-Time Losses

Cutting tool changes on automated machines usually mean costly idle time. It's hard to avoid. Setting the tools to the rigid accuracy required by numerically-controlled units just naturally takes time. But there's a way around the problem. It hinges on a new machine that presets the cutting tools to precise tolerances. It sets both diameters and depths for boring bars, milling cutters, drills and other accessory tooling. The newcomer mounts a presetting spindle on a rigid cast-iron base. This spindle has transverse- and longitudinal-slide adjustments. These slide elements have optical measuring instruments that read directly to 0.0001 in. without interpolation. One optical unit controls the diameter settings. The other sets length or depth. (De-Vlieg Machine Co.)

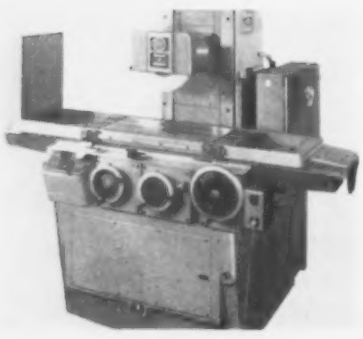
For more data circle No. 40 on postcard, p. 105



Automatic Flying Shear Slices Large Tubing

With a 200-ton capacity, this new standard flying-shear unit is the largest of its type ever built. It automatically cuts off tubing up to 6-in. OD with wall thicknesses ranging from 0.050-0.250 in. Maximum rate is 20 cuts per minute. Savings in scrap result from its ability to cut out short test samples and bad sections of tubing. (Alpha Press & Machine, Inc.)

For more data circle No. 41 on postcard, p. 105



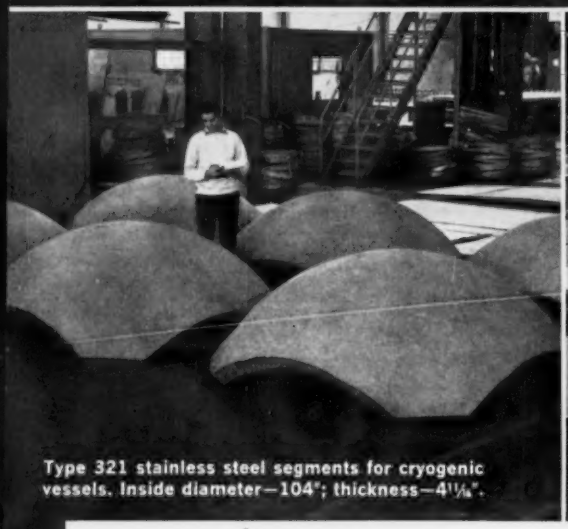
Surface Grinder Handles Intricate Die Sections

The latest addition to a line of surface-grinding machines has a new table that's wide in proportion to its length. The dimensions are 12 x 24 in. It's best suited for a tool shop engaged in highly-accurate die grinding. However, the machine takes on general production work with the addition of an automatic slot- and surface-grinding attachment, a wet-grinding attachment and a vertical position indicator. The grinder's massive spindle mounts on the flange. This allows precise slot and shoulder grinding, always a difficult problem in machining intricate die sections. A 5-hp motor supplies the power. (Browne & Sharp Mfg. Co.)

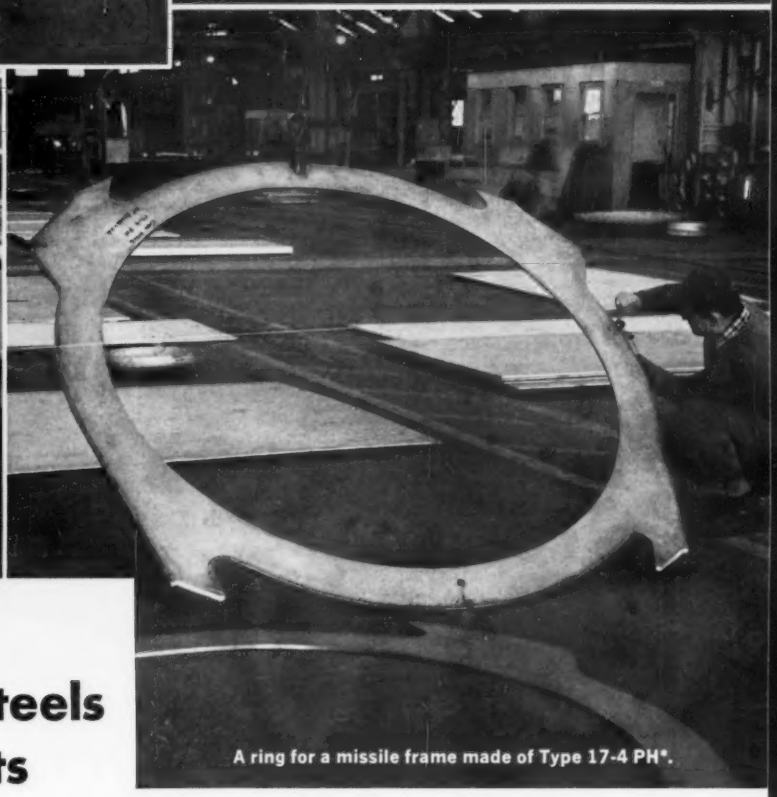
For more data circle No. 42 on postcard, p. 105

Indexing plate for nuclear storage cask. Type 304. Outside diameter—44⅜"; thickness—2¼".

Half-circle charge plates for furnaces made of Type 430 stainless steel. Outside diameter—68½"; inside diameter—16"; thickness—¼".



Type 321 stainless steel segments for cryogenic vessels. Inside diameter—104"; thickness—4¹¹⁄₁₆".



A ring for a missile frame made of Type 17-4 PH*.

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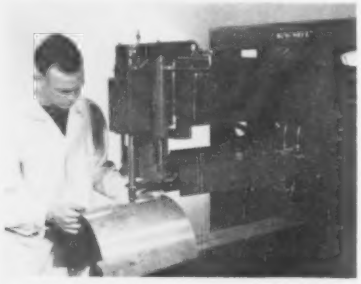
Ultrasonic Welder

Remote location of the power source, away from the welder, is a significant feature in a new 4000-w ultrasonic spot welder. Small interconnecting cables, which can be 100 ft or more in length, link the



two units. This makes installation and moving of the welder a simple matter. It fits into close-packed production areas, where space is at a premium. The new unit is of commercial interest for a variety of metal and bi-metal joining. It's effective for joining refractory metals, because its operation is essentially a solid - state process. (Sonobond Corp., a subsidiary of Aeroprojects Inc.)

For more data circle No. 43 on postcard, p. 105

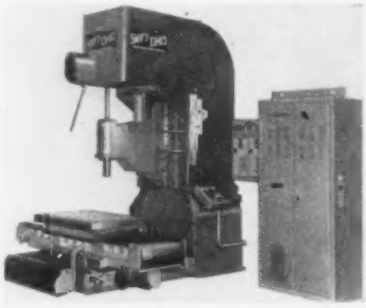
Automatic Profiler

According to the manufacturer, an electronic, tracer-controlled profile-milling machine performs many classes of milling operations previously thought impossible for tracer-controlled machines. In other words, they say the hand profiler is obsolete. The new machine does automatic, continuous milling of simple or complex shapes from 2-dimensional master templates. In addition to normal tracer-controlled work, it handles many rectangular and square "pocket"-type cuts. This was formerly done by several setups in plain milling. This machine does it with one setup. (Pratt & Whitney Co., Inc.)

For more data circle No. 44 on postcard, p. 105

Drilling Machine

Offering unusual versatility, this numerically-controlled drilling machine can also be positioned man-



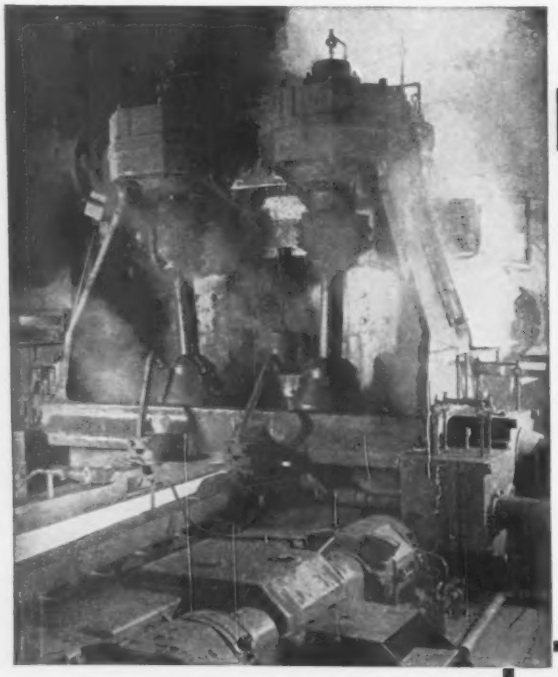
ually. The hydraulic feed to the spindle is infinitely variable, with a fine- and coarse-feed range. Programming cams permit automatic cycling of the rapid advance, feed to depth and rapid return. The coarse feed range, with reversing-spindle control, facilitates an automatic tapping cycle. Should the numerical system fail for any reason, the manual control can take over. This feature is also useful for an occasional, light-milling operation. (Swift-Ohio Corp.)

For more data circle No. 45 on postcard, p. 105

"Remembers" Torque

For mechanical checks of stress, strain, thrust, tension and compression, this new torque wrench records the peak reading. In a typical situation, the receiving - inspection department of a firm purchasing fasteners makes periodic determinations of the maximum torque which a nut, bolt or screw will take before

its elastic limit is reached and the fastener suddenly yields or snaps. Since the test operator does not have to think back to where the reading was, at the moment of yield, tests with the new wrench are fast and accurate. As torque is exerted, the memory indicator



Edging hot strip steel

No place for second-best equipment. That's why this heavy-duty vertical overdrive edger uses rugged Cone-Drive **double-enveloping worm** gearing to drive the vertical rolls continuously.

Rugged Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS

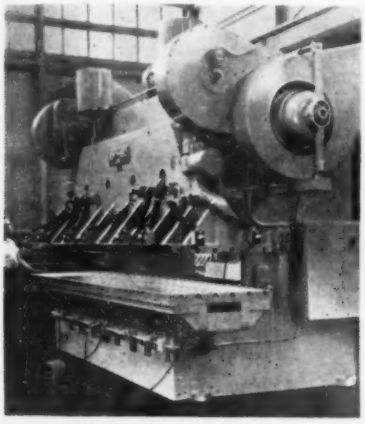
DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

moves along a track on the face of the scale. It remains at the maximum reading. (P. A. Sturtevant Co.)

For more data circle No. 46 on postcard, p. 105

Press Brake

Able to handle greater die lengths and widths, a new, 10-ft press brake develops 225 tons at or near the bottom of its stroke. The permanently widened, 36-in. die bed and ram provide adequate backup for large die sets. In addition, the double-plate bed has a shelf to adapt die cushions for press applications requiring such units. Twelve-in. extensions at both ends increase the usable die length to 14 ft. Added features include remote



control to the power-ram elevation, air counter-balances, tonnage load indicator, electro-magnetic brake on the arm adjusting motor and automatic ram stop at the top of stroke with a non-repeat feature and reversing control. (The Cincinnati Shaper Co.)

For more data circle No. 47 on postcard, p. 105

Research Aid

Offering a common work coil and two frequencies, a new generator provides research personnel with a tool to investigate the effects of frequency on zone refining. Its common, single-turn work coil instantly switches from 300 kilocycles to 7 megacycles. A saturable reactor gives output control. The generator itself rates at 15 kw for continuous duty at either frequency. It will serve in practically any induction-heating process. Proper shielding and arrangement of parts has elim-

inated any interaction between the output circuits. (Induction Heating Corp.)

For more data circle No. 48 on postcard, p. 105

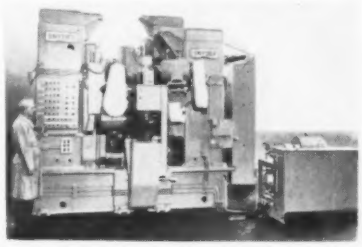
Paint-Spray System

Now, for the first time, painting can be done without using air to operate the paint pump. Instead, a new unit uses a small electric motor to power the spray system. This means operating economy. The newcomer is ideal for painting contractors, construction and highway maintenance. A small 110-v alternator, attached to a car or truck, makes it completely portable. (S & S Engineering Co.)

For more data circle No. 49 on postcard, p. 105

Transfer Machine

A segmented, 13-station transfer machine mills, orients, drills, chamfers, reams and taps cast-iron, automotive-clutch housings. And, it does this at a rate of 150 pieces per hr at 100-pct efficiency. One unusual feature is the design of the



work fixtures provided for the five machining stations. A pawl-type, rotating-bar mechanism transfers

MANY FAST'S HAVE BEEN WORKING LONGER THAN YOU

It's a fact. There are plenty of cases where Fast's Couplings have been in service 20 to 40 years. And some of our more enthusiastic engineers say a Fast's should last forever if it's properly applied, installed and lubricated. Whatever opinion you accept, you can bet Fast's Couplings will give you the same smooth-running, low-maintenance, long-lived performance that makes them the choice of more equipment manufacturers than any other gear-type coupling.

For example, Fast's Coupling No. 1347, shipped in July, 1922, is still in service—and the customer is just ordering his first spare coupling 38 years later.

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American Rolling Ring Metal Turnings Crushers quickly pay for themselves. Savings of approximately $4.00 per ton through extra cutting-oil recovery from crushed turnings often pay for the crusher in a short time. In addition, uniform chips command a higher price (up to $4 more per ton). Add to this the valuable savings in storage space (up to 75% less), the easier handling, the heavier car loadings possible, and you have tremendous profit advantages with the American Crusher working in your plant.

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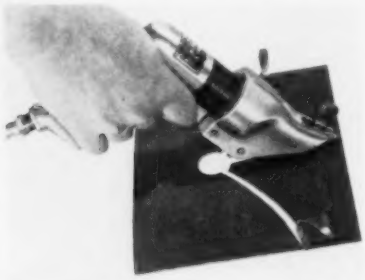
NEW EQUIPMENT

the parts from station to station by sliding them along on rails. The clutch housings are secured from the inside in the work fixtures, with clamps that bear on the top of a concealed flange. Disappearing jaws in the work fixture solve the problem of lowering the jaws after machining to let each part slide free. (Snyder Corp.)

For more data circle No. 50 on postcard, p. 105

Sheet-Metal Shear

Cleanly and without distortion, a new sheet-metal shear scissors a 7/32-in. path through 18-gage mild steel, 1/16-in. laminated plastic, aluminum, tin and many types of fiberglass. It combines the efficiency and economy of an air motor with a versatile cutting head. Since the aluminum shear housing rotates



through a full circle, the unit is convenient for cutting in overhead or hard-to-reach areas. (Buckeye Tools Corp.)

For more data circle No. 51 on postcard, p. 105

Cold-Jacket Furnace

For continuous operation at 2500°C, a new cold-jacket vacuum furnace is heated internally by six pairs of tungsten strips. These strips are suspended by water-cooled feed troughs. Surrounding the heaters are concentric tungsten and molybdenum radiation baffles. This entire assembly is placed in a water-cooled vacuum jacket. The result is an efficient furnace suitable for sintering, melting and annealing high-temperature metals. It will also handle degassing of metals and ceramics. (F. J. Cooke, Inc.)

For more data circle No. 52 on postcard, p. 105

June Gets Off to Good Start

Incoming orders continue to reflect the strength that became apparent in May. But orders should slow by month's end.

Another upturn is expected by September. The question: Will it bring higher prices?

■ The comparatively strong demand for steel that showed up in May is continuing into June. But the present ordering rate is higher than the rate of steel consumption. Thus, there will be a slight leveling-off as a milder-than-usual summer slump sets in.

Incoming orders in the past week ranged between 65 and 80 pct (of steelmaking capacity). The order intake rate varies with the location of the steel plant and the types of products.

Midwest Is Best—Sheets, strip, tinplate, galvanized and bars continue to get the biggest play. And the greatest strength continues to be shown in the Midwest.

But the East Coast is beginning to show some improvement. May turned out to be the best month of the year for a number of products including plate, pipe and tubing, and sheet and strip. And the activity has been extended into June.

Generally, however, new orders are expected to ease late this month. Mill operations should start leveling off by early July. With only a few exceptions, shipments to the auto industry for 1961-model production will be ended by the middle of this month. (For story on automotive changeover schedules, see p. 75).

Auto Output—May auto output of 542,000 units was the best production month of the year. It was also the highest since last November. And the total was substantially above the April output of 447,000 cars. But it was still well below the 612,000 cars produced in May, 1960.

June schedules still call for production of better than 500,000 units, but will be below May. Output is expected to be in the range of 515,000 to 520,000.

While automakers have already started taking delivery of some 1962-model steel, the big push won't come until late in August. Steelmaking operations should start rebounding by the first week in September. And the big upturn should be underway in October.

Contract Talks—One thing that could throw this schedule off is a strike in the auto industry. Contracts with the Big Three—General Motors Corp., Ford Motor Co., and Chrysler Corp.—all expire at the end of August. New contract negotiations are scheduled to get underway before the end of this month.

About the time demand is expected to start bulging in the fall, the steel companies will be hit by automatic wage increases of 7¢ to 10¢ an hour.

Price Question — Steelmakers have already said the industry is long overdue for a price hike. But the steel companies face an uphill battle if they decide to boost prices this year. And ultimately, the decision may be made in Washington—at least indirectly (see story p. 63).

Price cutting in stainless steel and boosting distributor discounts for oil country goods, along with the tendency on the part of mills and service centers to overlook extras, hardly create an atmosphere for price increases soon. In addition, many large steel users say they would resist higher prices.

District Steel Production Index
1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	104	106	105	95
Buffalo	119	120	120	100
Pittsburgh	95	98	92	92
Youngstown	104	103	96	47
Cleveland	125	122	124	107
Detroit	139	142	128	118
Chicago	115	115	106	102
Cincinnati	114	118	115	86
St. Louis	125	123	114	98
Southern	106	108	106	82
Western	119	121	127	97
U. S. Index	110.1	111.5	106.7	92.6

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	2,052	2,077	37,141	53,606
Ingot Index				
(1957-59=100)	110.1	111.5	90.6	130.8
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel base (Cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$37.83	$36.83	$36.50	$31.50
No. 2 bundles	$25.17	$24.17	$24.17	$21.17

Shell Coring Castings Grow

Castings buyers should watch shell coring methods. They're growing in popularity.

Reason: So far they've lowered some costs and produced good fine-finish results.

▪ Malleable iron castings made with shell-molded cores are becoming one of the industry's biggest talking points with purchasing agents. And business generally is picking up slowly, with a strong assist from compact cars.

"Shell coring methods in malleable iron castings certainly bear looking into by castings buyers and parts designers these days," says Lowell Ryan, managing director, Malleable Founders Society, Cleveland.

"A few of the places it is working out extremely well are for fine finish interiors such as the inside of transmission cases, differential carriers and similar uses. These are difficult and costly to finish by hand. So the fine as-cast surface from shell coring is becoming more popular and saving final costs to boot. Shell coring has climbed to possibly five or 10 pct of our industry business. This is still small, but a big percentage increase. And it gives us lots of flexibility."

Big Producer—One of the malleable iron foundries most active in shell coring with light-weight castings is Laconia Malleable Iron Co., Laconia, N. H. It's now turning out 60 pct of its cored jobs using the resin and about 10 to 15 pct of all its mold work also.

Richard Lavalle, production manager, LMIC, says: "We have even found that shell coring made possible a few jobs which couldn't be conveniently cast by other methods.

"We are using shell coring on short run work too—on runs of only 75 molds at a time—and it comes out with a better surface, but competitively priced. The increased cost of the resin and other materials is more than picked up by lower costs in handling, and by by-passing ovens and core finishing. We're sending some as far as Michigan."

On one job at Laconia, shell coring eliminated a sizing operation which was part of the cycle on conventional cores. With regular cores, some castings came out slightly undersized and the scrap rate was abnormally high. Shell corings ended the problem. The parts involved were clamps and fittings for scaffolds.

Limitations — There are limitations, of course. One part that didn't work was a pancake-shaped core 16-in. in diameter. The edge burned through before the center had set.

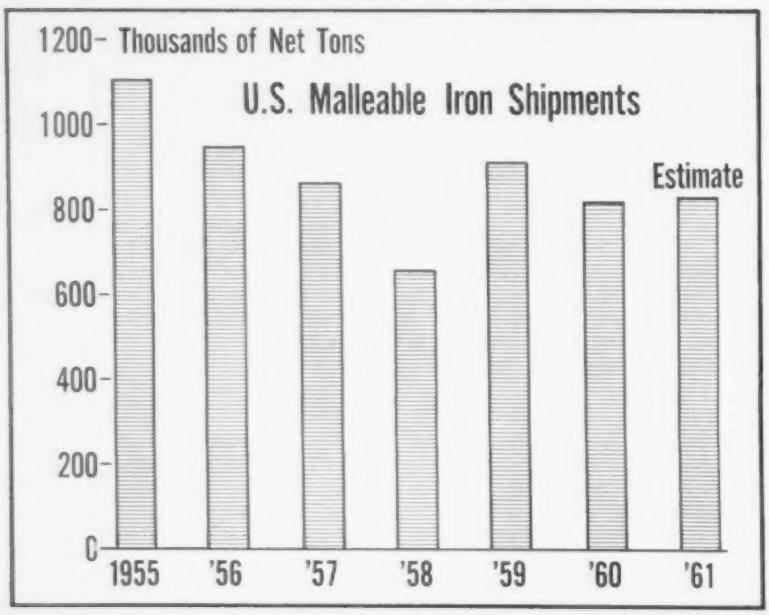
The bulk of castings made by Laconia are machine parts for the textile industry, valves, fittings and electrical parts. Average casting weight is 7/10 lb. And the average weight of cores is three or four ounces.

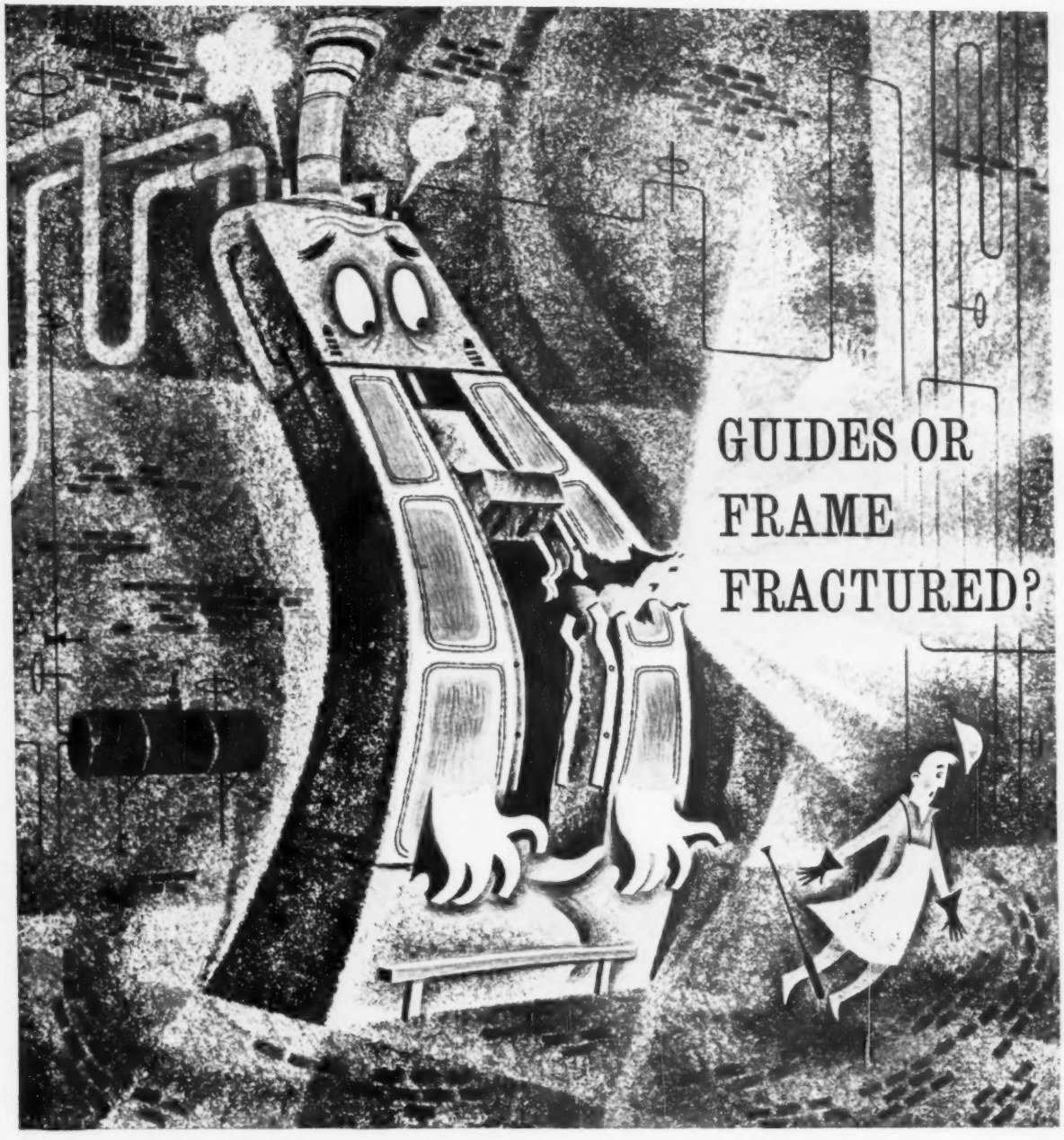
Malleable castings production this year is slowly improving at a rate of two or three pct each month. Three General Motors Corp. compacts — Pontiac Tempest, Oldsmobile F-85, and Buick Special—all have pearlitic malleable crankshafts. Possibly half of these are purchased from independent foundries.

Shipments Up — This breakthrough raised pearlitic's portion of total malleable shipments from five pct in 1950 to 25 pct last year. It is now a $75 million industry by itself.

Total malleable iron shipments in 1960 were 820,000 tons. Shipments this year should equal or slightly exceed this figure.

Another Fair Year Ahead?





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Mills Reduce Prices To Hold Buyers

While need for steel price increases is debated, mills are forced to cut some base prices and sweeten discounts.

Price changes involve stainless strip and jobber discounts on oil country pipe.

■ Faced with base price cuts and discount concessions, mill marketing men are little interested in talk about higher steel prices.

Right in the middle of discussion on the need for higher prices, came a flurry of price reductions. The major activity was in stainless strip and oil country goods. (See story, p. 62.)

Here's what happened:

Allegheny Ludlum Steel Corp., followed by others, reduced twelve grades of cold-rolled stainless strip from 1¢ to 4¢ a pound. Size extras for strip were also reduced. And a new quality class, with lower prices, was set up for stainless sheets.

Different View—Another stainless producer, Armco Steel Corp., made its stainless strip base prices and extras competitive with Allegheny-Ludlum. But Armco refused to go along on the new quality class in stainless sheet. Instead Armco reduced gage and width extras on standard stainless sheet, 48 in. and under, by ½¢ to 3½¢ a pound.

Larger Jobber Discounts—Later last week, U. S. Steel Corp. and Republic Steel Corp. made what amounted to a price reduction, when they boosted discounts 3 to 4 pct on shipments of oil country pipe into jobber stocks.

USS said the move was made to allow jobbers to stock oil country seamless in more locations. Other producers said the change will give independent jobbers an added incentive to carry inventory.

Demand for rush service has forced mills to carry heavy pipe stocks at both producing points and downriver depots. With this service available, jobbers as well as oil producers have been able to operate with low inventories. Now the inventory pattern may shift a degree.

Another reason for the boost in discounts: Producers charge some mill-owned supply sources have been shipping out of stock to end users and charging mill prices. This has brought a demand from independent jobbers, who mark up stock shipments, for an added discount. Formerly the discount was 6 pct on both direct shipments to users and shipments into stock.

Bar Also Reduced—In another move, cold-finished bar makers at Los Angeles reduced some base prices because of competition from Midwest mills. Officially the reason was an effort to pass on to users the elimination of a 3 pct transportation tax about two years ago.

This freight cut meant California users could buy cold-finished bars from Midwest mills at prices about equal to those on the West Coast.

Now base prices of cold-finished bars over 3½-in. diam have been reduced from $9.65 to $9.625 a hundredweight. The cuts were initiated by Pacific Tube Co., followed by Republic Steel Corp. and the Sierra Drawn Div. of Bliss & Laughlin, Inc.

On smaller sizes—generally those under 3-in. diam—there was no change in the base price of $9.10 a hundredweight.

Some Linepipe Reduced—In still another price reduction, National Tube Div. of U. S. Steel, effective June 5, cut mill prices of some grades of seamless linepipe $18 a ton. The move was to "recognize competitive conditions," USS said.

The change affects only seamless black linepipe in API grade 52 and only in 6⅝ in. through 12¾ in. OD inclusive double random lengths, for minimum carload quantities of each diameter and wall thickness.

Sheet and Strip — In Midwest markets, notably **Chicago** and **Detroit,** deliveries are stretching out. At **Chicago,** some shipments of sheet and strip are running a week late. But two factors have prevented any further lengthening of deliveries: (1) supplies are still coming in from out-of-the-area mills on fast shipment; and (2) some buyers still count on getting through June without any pinch.

At **Pittsburgh,** mills expect June sheet orders to equal or top May's. A letdown is expected in July. Aside from auto sheet buying, **East Coast** users are mostly inactive.

Wire—Orders at **Midwest** mills are upsetting forecasts. Some wire grades have moved out to two-week delivery. Orders for wire mesh and barbed wire are keeping mills busy. Heavier ordering by jobbers in merchant wire products should help the summer months. In **Pittsburgh,** demand for manufacturerers wire is not strong, but running ahead of expectations. July cutbacks by auto plants will hurt sales.

PURCHASING AGENT'S CHECKLIST

Why mills cut stainless strip prices. P. 62

Toolbuilders are generally cool to Administration's incentive credit plan to encourage machinery modernization. P. 67

New process developed for automatic heat treating. P. 79

COMPARISON OF PRICES

(Effective June 6, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	June 6 1961	May 29 1961	May 8 1961	June 7 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	14.10
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) coke	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	June 6 1961	May 29 1961	May 8 1961	June 7 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.57
Foundry, South Cin'ti.	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	70.11	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese 74-76 pct Mn. cents per lb.‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.44	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$36.50*	$35.50	$34.50	$31.50
No. 1 steel, Phila. area	39.50	39.50	39.50	33.50
No. 1 steel, Chicago	37.50*	35.50	35.50	29.50
No. 1 bundles, Detroit	34.50	34.50	33.50	27.50
Low phos. Youngstown	40.50	40.50	37.50	34.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	45.50	49.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	51.50
No. 1 mach'y cast, Chicago	48.50*	47.50	47.50	48.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$37.83*	$36.83	$36.50	$31.50
No. 2 bundles	25.17*	24.17	24.17	21.17
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	31.00	31.00	29.00	33.00
Copper, Lake, Conn.	31.00	31.00	29.00	33.00
Tin, Straits, N. Y.	111.125†	111.125**	109.75	101.00
Zinc, East St. Louis	11.50	11.50	11.50	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Mills Enter Rising Market

Mills came into the market in several key areas this week for buys at slightly higher levels.

But the Japanese will be taking less scrap during the third quarter.

■ Mills began entering the scrap market for tonnage in most key areas this week. And with this came additional price increases.

But the big reason behind recent gains is still industrial lists. June lists carry prices $1 and $2 above May levels. And dealers are still bullish in anticipation of greater demand and a rising market.

Also, this week, the Japanese made third quarter commitments. While many scrapmen looked for increased tonnage to be exported, reports say the Japanese actually want fewer cargoes than during the second quarter. However, prices are said to be "about the same as are now being paid."

Even with this reported drop in third quarter shipments to Japan, there is still a good chance that 1961 will develop into a record year for U. S. scrap exports.

The IRON AGE composite price, based on strength in Pittsburgh and Chicago, moved up again this week for No. 1 heavy melting and No. 2 bundles. The new price for No. 1 heavy melting is $37.83; the price for No. 2 bundles is $25.17.

Pittsburgh — Prices of No. 1 grades moved up $1 this week as mill purchases followed the trend indicated by industrial lists. A mill on the fringe of the district came out with a price of $37 to the dealer for No. 1 heavy melting. This was $2 over the same mill's price last month and $1 above the latest appraisal of the market. A price of $38 is being quoted for a mill in one bordering district and consumers west of here are said to be paying over $40 for prime scrap. Early railroad lists indicate the market is still moving up. But there has been little or no increase in local trading volume.

Chicago — Scrap continued to tighten as a major mill advanced its industrial heavy melting price and smaller mills began buying. Expectation of stronger export demand this month has dried up scrap. Additional blast furnaces put into operation by local mills have failed to stop the advance in prices. Yards continue to purchase material for inventory; they're not pushing to sell.

Philadelphia — Local buys brought the price of No. 2 heavy melting and No. 2 bundles up another $1 this week. This market is definitely firm and most scrapmen are looking for the next major buys to be at even higher prices. Reports are that export will take less scrap this quarter.

New York—Dealers continue to be optimistic. They say any price movement has to be upward because of rising steel operating rates. But the market itself, while reasonably firm, is unchanged from last week.

Detroit — Business is coasting along following industrial list activity. There are no big sales at this point. But there are some reports of minor export buying of heavy melting scrap. Canada still has shown no real sign of interest although some quiet deals on busheling have been rumored.

Cleveland—Mills are taking only the top grades as they continue to stress quality. One mill has a large order out for railroad steel or the equivalent from restricted yards for $38. But new tonnage is going for higher levels. Special lots of small tonnage are also moving in the Valley.

Cincinnati—Area mills are in the market at $1 above previous levels. Bulk of the tonnage is being filled from the immediate area because of lower freight rates. Some scrap is moving upriver to Pittsburgh.

St. Louis—Dealers remain optimistic over price potentials. But there is no change for now. The undertone of the market remains very firm. Mills are doing little buying at this time.

Birmingham—Activity picked up this week as Atlanta and Birmingham electric furnaces and an Atlanta openhearth consumer placed orders at prices $1 to $2 above the last purchases. A pipe manufacturer placed a June order.

Buffalo—New business and small tonnages were placed with dealers this week for June delivery. Prices remain unchanged. However, some export scrap, ordered earlier in the spring, is beginning to move.

Boston—The market remains unusually quiet with very little activity domestically or for export.

West Coast — It's reported that the Japanese orders for the third quarter are in. Commitments are for fewer cargoes than in the previous period. Substantial tonnage will come from West Coast ports.

Houston — The district mill is starting an inventory reduction program. This weakens the market prospects for scrapmen here. Exporters voice a reluctance to come into the market now.

SCRAP PRICES *(Effective June 6, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	37.00 to 38.00
No. 1 factory bundles	42.00 to 43.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	18.00 to 19.00
Low phos. punch'gs plate	41.00 to 42.00
Heavy turnings	31.00 to 32.00
No. 1 RR hvy. melting	39.00 to 40.00
Scrap rails, random lgth.	46.00 to 47.00
Rails, 2 ft and under	50.00 to 51.00
RR specialties	42.00 to 43.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	34.00 to 35.00
Stainless	
18-8 bundles and solids	180.00 to 185.00
18-8 turnings	100.00 to 110.00
430 bundles and solids	80.00 to 85.00
410 turnings	55.00 to 60.00

Chicago

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	38.00 to 39.00
No. 1 factory bundles	42.00 to 44.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	37.00 to 38.00
Machine shop turn.	16.00 to 17.00
Mixed bor. and turn.	18.00 to 19.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Low phos. forge crops	45.00 to 46.00
Low phos. punch'gs plate, ¼ in. and heavier	45.00 to 46.00
Low phos. 2 ft and under	42.00 to 43.00
No. 1 RR hvy. melting	41.00 to 42.00
Scrap rails, random lgth.	47.00 to 48.00
Rerolling rails	58.00 to 60.00
Rails 2 ft and under	50.00 to 51.00
Angles and splice bars	45.00 to 46.00
RR steel car axles	59.00 to 60.00
RR couplers and knuckles	44.00 to 45.00
No. 1 machinery cast.	48.00 to 49.00
Cupola cast.	43.00 to 44.00
Cast iron wheels	35.00 to 36.00
Malleable	47.00 to 48.00
Stove plate	38.00 to 39.00
Steel car wheels	43.00 to 44.00
Stainless	
18-8 bundles and solids	180.00 to 185.00
18-8 turnings	105.00 to 110.00
430 bundles and solids	90.00 to 95.00
430 turnings	50.00 to 55.00

Philadelphia Area

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 dealer bundles	41.00 to 42.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	40.00 to 42.00
Machine shop turn.	13.00 to 14.00
Mixed bor. short turn.	16.00 to 17.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Clean cast. chem. borings	26.00 to 27.00
Low phos. 5 ft and under	42.00 to 43.00
Low phos. 2 ft punch'gs.	44.00 to 45.00
Elec. furnace bundles	42.00 to 43.00
Heavy turnings	27.00 to 28.00
RR specialties	42.00 to 43.00
Rails, 18 in. and under	52.00 to 54.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	39.00 to 40.00
Cast iron car wheels	40.50 to 41.50
Malleable	48.00 to 49.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	28.50 to 29.50
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	10.00 to 11.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Low phos. 18 in. and under	39.00 to 40.00
Rails, random length	42.00 to 43.00
Rails, 18 in. and under	46.00 to 47.00
No. 1 cupola cast.	34.00 to 35.00
Heavy breakable cast.	31.00 to 32.00
Drop broken cast.	45.00 to 46.00

Youngstown

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	27.50 to 28.50
No. 1 dealer bundles	38.00 to 39.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Low phos. plate	40.00 to 41.00

Cleveland

No. 1 hvy. melting	$34.50 to $35.50
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	34.50 to 35.50
No. 1 factory bundles	38.50 to 39.50
No. 2 bundles	22.50 to 23.50
No. 1 busheling	34.50 to 35.50
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut structural & plates, 2 ft & under	39.50 to 40.50
Low pros. punch'gs plate	35.50 to 36.50
Drop forge flashings	34.50 to 35.50
Foundry steel, 2 ft & under	34.00 to 35.00
No. 1 RR hvy. melting	39.00 to 40.00
Rails 2 ft and under	49.00 to 50.00
Rails 18 in. and under	49.00 to 50.00
Steel axle turnings	27.00 to 28.00
Railroad cast.	48.00 to 49.00
No. 1 machinery cast.	48.00 to 49.00
Stove plate	39.00 to 40.00
Malleable	51.00 to 52.00
Stainless	
18-8 bundles	170.00 to 175.00
18-8 turnings	100.00 to 105.00
430 bundles	70.00 to 75.00

Buffalo

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 busheling	31.00 to 32.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	15.00 to 16.00
Low phos. plate	37.00 to 38.00
Structurals and plate, 2 ft and under	39.00 to 40.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast.	44.00 to 45.00
No. 1 cupola cast.	38.00 to 39.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
Foundry steel, 2 ft	31.00 to 32.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	12.50 to 13.50
Shoveling turnings	14.50 to 15.50
Cast iron borings	21.00 to 22.00
No. 1 RR hvy. melting	36.00 to 37.00
Rails, random lengths	39.00 to 40.00
Rails, 18 in. and under	43.00 to 44.00
RR specialties	39.00 to 40.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	32.00 to 33.00
Stove plate	32.00 to 33.00
Cast iron car wheels	34.00 to 35.00
Rerolling rails	54.00 to 55.00
Unstripped motor blocks	34.00 to 35.00

Birmingham

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	38.00 to 39.00
Machine shop turn.	18.00 to 19.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	10.00 to 11.00
Electric furnace bundles	38.00 to 39.00
Elec. furnace, 3 ft & under	36.00 to 37.00
Bar crops and plate	43.00 to 44.00
Structural and plate, 2 ft.	42.00 to 43.00
No. 1 RR hvy. melting	37.00 to 38.00
Scrap rail, random lgth.	41.00 to 42.00
Rails, 18 in. and under	46.00 to 47.00
Angles and splice bars	43.00 to 44.00
No. 1 cupola cast.	42.00 to 43.00
Stove plate	42.00 to 43.00
Cast iron car wheels	35.00 to 36.00
Unstripped motor blocks	31.00 to 32.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 2 dealer bundles	18.00 to 19.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	5.00 to 6.00
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	19.00 to 20.00
No. 1 machinery cast.	38.00 to 39.00
Mixed yard cast.	34.00 to 35.00
Heavy breakable cast.	32.00 to 33.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	31.00 to 32.00
Drop forge flashings	31.00 to 32.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	12.00 to 13.00
Heavy breakable cast.	28.00 to 29.00
Mixed cupola cast.	31.00 to 32.00
Automotive cast.	40.00 to 41.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	70.00 to 75.00
430 bundles and solids	70.00 to 75.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	17.00 to 18.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	4.00 to 4.50
Shoveling turnings	8.50 to 9.00
Clean cast. chem. borings	14.50 to 15.50
No. 1 machinery cast.	39.00 to 40.00
Mixed cupola cast.	31.50 to 32.00
Heavy breakable cast.	28.00 to 28.50

San Francisco

No. 1 hvy. melting	$41.00
No. 2 hvy. melting	38.00
No. 1 dealer bundles	28.00
No. 2 bundles	25.00
Machine shop turn.	15.00
Cast iron borings	15.00
No. 1 cupola cast.	$45.00 to 46.00

Los Angeles

No. 1 hvy. melting	$40.00
No. 2 hvy. melting	37.00
No. 1 dealer bundles	29.00
No. 2 bundles	$25.00 to 26.00
Machine shop turn.	15.00
Shoveling turnings	15.00
Cast iron borings	15.00
Elec. furnace 1 ft and under (foundry)	50.00
No. 1 cupola cast.	46.00

Seattle

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	38.00
No. 2 bundles	25.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$31.00
No. 2 hvy. melting cut 3 ft and under	28.00
No. 1 dealer bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Bush., new fact., prep'd	31.00
Bush., new fact., unprep'd.	25.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	31.00
No. 2 bundles	24.00
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft & under	$45.00 to 46.00
Unstripped motor blocks	29.00 to 30.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	29.00 to 30.00

Copper Buyers Ease Pressure on Price

Copper consumers are still resisting the recent increase in price.

As they hold down their buying, time seems to be working in their favor.

■ The copper market is basically unchanged from last week.

Consumers are trying to hold down their buying and keep the pressure off the price. Many don't think they can do this for very long.

Time Factor—It is now apparent, however, that time is working in favor of the consumers. Every day that passes strengthens their position.

Here's why:

First, there has been some weakness in the scrap copper prices. These prices have been a major spur on primary prices. Smelters must keep the margin between what they pay for scrap and the price they get for the metal they make from scrap in order to turn a profit.

Under Peak—List scrap prices are now running over 1¢ per lb under the peak for the last month or so. And there is even more of a spread between current prices and prices many scrap buyers were actually paying when they needed metal badly.

The strike at Braden Copper Co., Kennecott's Chilean operation has been resolved. This had been worrying some buyers.

June Slack—Some copper fabricators now believe total June shipments of their mill products will not match May. This means, they believe, that some customers were hedging when the copper price was moving a few weeks ago.

Also, in less than a month the traditional vacation period will start in the copper fabricating industry. This means less pressure all the way around. In fact, some copper men say if the market gets through June without an increase in price, it will be safe through the summer—or at least through July.

Brass Bounce—Brass mills report business is better. But they are not sure how much of the buying in May of shelf items was a hedge against further price increases. They are sure some was.

The brass mills don't look for any drop in buying. But they do expect some leveling off as July draws near. Most say their copper stocks are in good shape. "There is no great pressure on us to buy copper," says the president of one major mill.

New Attitude—Perhaps the most important factor, though subtle: Attitudes in the copper industry are changing.

In a speech to the National Assn. of Purchasing Agents early this week in Chicago, Dr. Joseph Zimmerman, vice president, Miles Metal Corp., said, "There is no copper shortage at home or abroad and none is likely for the balance of the year—despite the recent price advances and in spite of the fact that domestic consumers have been unable to buy all that they want."

Dr. Zimmerman notes that the unsold stock of world copper producers at the end of April totaled 447,000 tons. It was cut 30,000 tons during April from what had been an all-time high.

Stock Shift — Dr. Zimmerman estimates that 25,000 tons of the total reduction were in the U.S., and that "a good portion represented a shifting of stocks from producers to consumers."

He admits the chance of a strike at Kennecott's domestic mines, and not as much foreign copper being shipped to the U.S.

But he says, "Long before a shortage is threatened there is every reason to believe that the producers who curtailed their output last year and early this year will go back to full operations as Kennecott did. This would add about 215,000 tons a year to output."

Tin Prices for the Week

May 29—111.375; May 31—111.125; June 1—111.25; June 2—111.25; June 5—111.125*.

*Estimated.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in MAY based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, del'd Conn. Valley	30.41
Copper, Lake	30.41
Straits, Tin, New York	110.08
Zinc, E. St. Louis	11.50
Lead, St. Louis	10.80
Aluminum ingot	26.00

Note: Quotations are on going prices

Primary Prices

(cents per lb.)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	31.00	30.00	5/16/61
Copper (CS)	31.00	30.00	5/17/61
Copper (L)	31.00	30.00	5/17/61
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium Ingo	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/56
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% Ingot. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 127.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size*	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/2
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	56.13	.....	53.61	57.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	52.15	52.44	52.09	56.21
Brass, Red	53.17	53.46	53.11	57.23
Brass, Naval	53.94	60.25	47.75	58.10
Muntz Metal	51.94	.....	47.25	.....
Comm. Bz.	54.73	55.02	54.67	58.34
Mang. Bz.	57.71	61.54	51.27	.....
Phos. Bz. 5%	76.97	76.72	77.47	78.90

Free Cutting Brass Rod 34.77

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 32.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.70
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base .... $ 1.31
Cobalt, 97-99% (per lb) ..$1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz. $35.00
Indium, 99.9% dollars per troy oz..$ 2.25
Iridium, dollars per troy oz. .... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $203 to $205
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz. .$24 to $26
Platinum, dollars per troy oz. .$82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 32.00
- No. 120 ..... 31.25
- No. 123 ..... 30.50

80-10-10 ingot
- No. 305 ..... 36.00
- No. 315 ..... 33.75

88-10-2 ingot
- No. 210 ..... 43.75
- No. 215 ..... 40.50
- No. 245 ..... 35.75

Yellow ingot
- No. 405 ..... 27.50

Manganese bronze
- No. 420 ..... 30.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 23.75-24.25
- 0.60 copper max. 23.50-24.00

Piston alloys (No. 132 type)..25.00-26.00
No. 12 alum. (No. 2 grade)...21.75-22.25
108 alloy 22.25-22.75
195 alloy 24.75-25.75
13 alloy (0.60 copper max.)...23.50-24.00
AXS-679 (1 pct zinc) 22.00-23.00

Steel deoxidizing aluminum notch bar granulated or shot
- Grade 1—95-97½% 23.25-24.25
- Grade 2—92-95% 22.00-23.00
- Grade 3—90-92% 21.00-22.00
- Grade 4—85-90% 20.00-21.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	27	26¼
Yellow brass	20⅜	18½
Red brass	23⅞	23⅛
Comm. bronze	24¾	24
Mang. bronze	19¼	18½
Free cutting rod ends	19½	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 28⅜
- No. 2 copper wire 26⅜
- Light copper 24½
- *Refining brass 25½
- Copper bearing material 24½

*Dry Copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 28⅜
- No. 2 copper wire 26⅜
- Light copper 24½
- No. 1 composition 24½
- No. 1 comp. turnings 24
- Hvy yellow brass solids 19
- Brass pipe 18
- Radiators 19½

Aluminum

- Mixed old cast. ..... 12½—13
- Mixed new clips ..... 14½—15
- Mixed turnings, dry ..... 13½—14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

- No. 1 copper wire ..... 25⅜—26¼
- No. 2 copper wire ..... 23⅜—24¼
- Light copper ..... 21½—22
- Auto radiators (unsweated) . 17 —17½
- No. 1 composition ..... 21½—22
- No. 1 composition turnings.. 21¼—21⅜
- Cocks and faucets ..... 17½—18
- Clean heavy yellow brass ... 14½—15
- Brass pipe ..... 17½—18
- New soft brass clippings .... 17½—18
- No. 1 brass rod turnings .... 17¼—17⅜

Aluminum

- Alum. pistons and struts .... 7 — 7½
- Aluminum crankcase ..... 9½—10
- 1100 (2s) aluminum clippings 12¼—12⅜
- Old sheet and utensils ..... 9½—10
- Borings and turnings ..... 4½— 5
- Industrial castings ..... 10 —10½
- 2020 (24s) clippings ..... 11 —11½

Zinc

- New zinc clippings ..... 5½— 5⅝
- Old zinc ..... 3½— 4
- Zinc routings ..... 1¾— 2
- Old die cast scrap ..... 1¾— 2

Nickel and Monel

- Pure nickel clippings 52-54
- Clean nickel turnings 40
- Nickel anodes 52-54
- Nickel rod ends 52-54
- New Monel clippings 23-23.50
- Clean Monel turnings 16.50-17
- Old sheet Monel 22-23
- Nickel silver clippings, mixed. 18
- Nickel silver turnings, mixed. 15

Lead

- Soft scrap lead ..... 7¼— 7⅜
- Battery plates (dry) ..... 3 —3¼
- Batteries, acid free ..... 2 —2¼

Miscellaneous

- Block tin ..... 81 —82
- No. 1 pewter ..... 61 —62
- Auto babbitt ..... 45 —46
- Mixed common babbitt ..... 10 —10½
- Solder joints ..... 15 —15½
- Small foundry type ..... 9 — 9½
- Monotype ..... 9¼— 9⅜
- Lino. and stereotype ..... 8½— 8⅝
- Electrotype ..... 8 — 8¼
- Hand picked type shells .... 5¾— 6¼
- Lino and stereo. dross ..... 1¾— 2¼
- Electro dross ..... 2½— 3

(Effective June 5, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				15.55 *C11*
	Harrison, N. J.													
	Conshohocken, Pa.		$99.50 *A2*	$121.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*	8.10 *P2*	5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.425 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3, Y1*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Struthers, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*		5.50 *Y1*			5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, N. Castle, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W3*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective June 5, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25* lb. base box	Electro** *0.25* lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*				$9.10 *U1*	$6.25 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*				Holloware Enameling 29 ga.—*7.85 U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; *7.95 G2* at Granite City.		
	Canton-Massillon, Dover, Canfield, Ohio			6.875 *R1, R3* 7.50 *C19**									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	$6.25 *U1, I3*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.125 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.40 *T2*	$9.10 *T2*	$6.25 *T2*
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets. ** For 55 lb.; for 60 lb. add 15¢.

†† 7.425 at Sharon; Niles is 7.225.

(Effective June 5, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*									
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8, H2* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, Y1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga. Jacksonville, Fla.	5.875 *A8*	5.00 *A8*									8.00 *A8* 8.35 *M4*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective June 5, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.
C19 Canfield Steel Co., Canfield, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B.. Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery; Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy B.			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore	$.10	7.87	9.71	10.16	11.35	9.70	9.95	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham		8.46	10.20	10.59	9.45	8.41	8.47	8.26	13.14	16.76	16.65	.....	.....
Boston**	.10	10.00	11.20	11.87	12.50	9.95	10.60	10.15	13.45	17.79	16.79	21.89	21.14
Buffalo	.15	8.70	9.45	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.85	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.90	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.07	11.66	9.45	10.11	9.69	11.40	17.21	16.21	21.31	20.56
Denver		11.55	12.53	13.03	13.72	11.39	11.90	11.55	12.98	.....	.....	.....	20.84
Detroit**	.15	9.63	10.61	11.20	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		10.17	10.98	11.35[3]	11.73	9.41	9.81	9.58	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	10.53	11.37	10.95	12.70	10.39	10.91	10.55	11.72	17.17	15.87	21.87	21.12
Los Angeles		10.35[1]	11.20	12.20	12.40	10.30	10.45	10.25	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.13	10.50	10.95	11.44	9.47	9.82	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	9.51	10.49	10.99	11.68	9.35	9.94	9.51	11.84	17.24	16.24	21.24	20.49
New York	.10	9.77	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	9.90	10.10	10.76	11.35	9.70	9.95	9.75	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		9.45	11.30	12.35	12.40	10.55	11.00	9.45	16.65	18.60	17.85	22.70	22.15
San Francisco	.10	10.27	11.79[2]	11.95	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle		11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	17.85	22.70	22.15
Spokane	.15	11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.35	17.75	17.95	21.58	22.30
St. Louis**	.15	9.57	10.75	11.23	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul	.15	9.72	10.39	11.54	11.89	9.56	10.07	9.72	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—3/16" x 1"; Plate—1/4" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—3/4-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1 3/8" to 2 7/8"; cold drawn—15/16" to 2 7/8" round; Hot-rolled 4140—3/4" to 2 7/8" round, cold drawn—15/16" to 2 7/8" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective June 5, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	65.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75c per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50c per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos. Add 50c per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75c per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46
Machine Screws—bulk		
¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50	32.00	29.50	47.50	38.00	46.50	—	19.25–21.50	—	19.75–21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25–26.75	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00–31.50	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25–31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	43.50	46.75	45.00	49.50	56.75	49.50	76.75	62.25	75.25	40.25	40.25	42.50	38.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25–29.75	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R3.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7,* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mills

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	2	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective June 5, 1961)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Annld	Merch. Wire Galv.
	Col	Col	Col	Col	Col	¢/lb.	¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dsv. *M4***	175	192	...	214	198	9.10	9.80
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2**	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	175	192	...	214	198	9.10	9.80††
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo C9*	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2***	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	.....	236	9.95	10.50
SparrowsPt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only. †† 0.115¢ zinc.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $290 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	⅛ In.		¼ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

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2303G North 11th St. • St. Louis 6, Mo.

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END NIGHT CLEANUP & MORNING REBLUING

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

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CHUCKING MACHINES
Tool Rotating
GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

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Standard Mundt perforations range from 950 holes per square inch to 0.046 holes per square inch in round hole patterns. You'll find equal variety in square, oblong, diagonal, diamond, herringbone and other decorative and functional patterns.

Mundt perforates all basic metals and alloys as well as bonded, coated, clad and textured metals, plastics, plywood, fibre and wood. Where a product has not been previously perforated, we will make an experimental run without charge to determine perforating qualities.

You'll find Mundt is small enough to take an interest in your minor perforation problems... large enough to provide quick delivery from its vast stocks. Write for the new Mundt catalog for your design and purchasing files.

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OUR 92ND YEAR
53 FAIRMOUNT AVENUE, JERSEY CITY 4, N. J.

FERROALLOY PRICES

NOTE: Prices of Boiler Tubes, Clad Steel, C-R Spring Steel, Electrical Sheets, Electrodes, Electroplating Supplies, Metal Powders, Rails and Track Supplies, and Refractories are published in alternate issues.

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 65-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	33.25
0.05% C....	34.00	1.00% C....	33.00
0.10% C....	33.75	1.50% C....	32.75
0.20% C....	33.50	2.00% C....	32.50

3-5% C, 53-63% Cr, 2.5% max. Si... 26.00
4-6% C, 58-63% Cr, 3-6% Si..... 22.50
5-8% C, 58-63% Cr, 3-6% Si..... 22.50
6-8% C, 50-56% Cr, 4-7% Si..... 22.00
4.00-4.50% C, 60-70% Cr, 1.2% Si.. 28.75
0.025% C (Simplex) 31.50
0.010% C max, 63-66% Cr, 5-7% Si. 32.50
0.010% C max, 68-71% Cr, 2% Si max 31.50
0.25% C max 33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.
0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.
Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.)
Carloads, delivered, lump, 3-in x down, packed.
Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	22.50	14.60
Ton lots	30.45	16.05
Less ton lots	33.40	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.
Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.
Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.
Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:
Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	35 lb, down	Neville Is., Pa. 35 lb
16-19% ..	$98.00	$96.00	$100.50
19-21% ..	100.00	98.00	102.50
21-23% ..	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.
Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.
Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	(Bulk) 37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80-85% Mn, 5.0-7.0% Si ...	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.
Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe ..	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.
Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.
50% Si.... 13.50 75% Si.... 16.90
65% Si.... 15.75 85% Si.... 18.60
90% Si.... 20.00

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.
Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb...	2.40	3.30	4.55

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.
Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb
Ton lots $3.45
Less ton lots 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Vanadis, O., O., freight allowed, ton lots, per lb contained Ti $1.35
Less ton lots (200 lb and up) $1.37

Ferrotitanium, 30% low carbon, 0.10% C max., 27-32% Ti, Vanadis, O., freight allowed, per lb contained Ti, ton lots $1.35
Less ton lots (200 lb and up) $1.40

Ferrotitanium, 1-3% Carbon, 17-20% Ti, f.o.b. shipping point, freight allowed, carload per net ton $250.00
Ton lots $260.00

Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.
Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy 35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 18.25¢

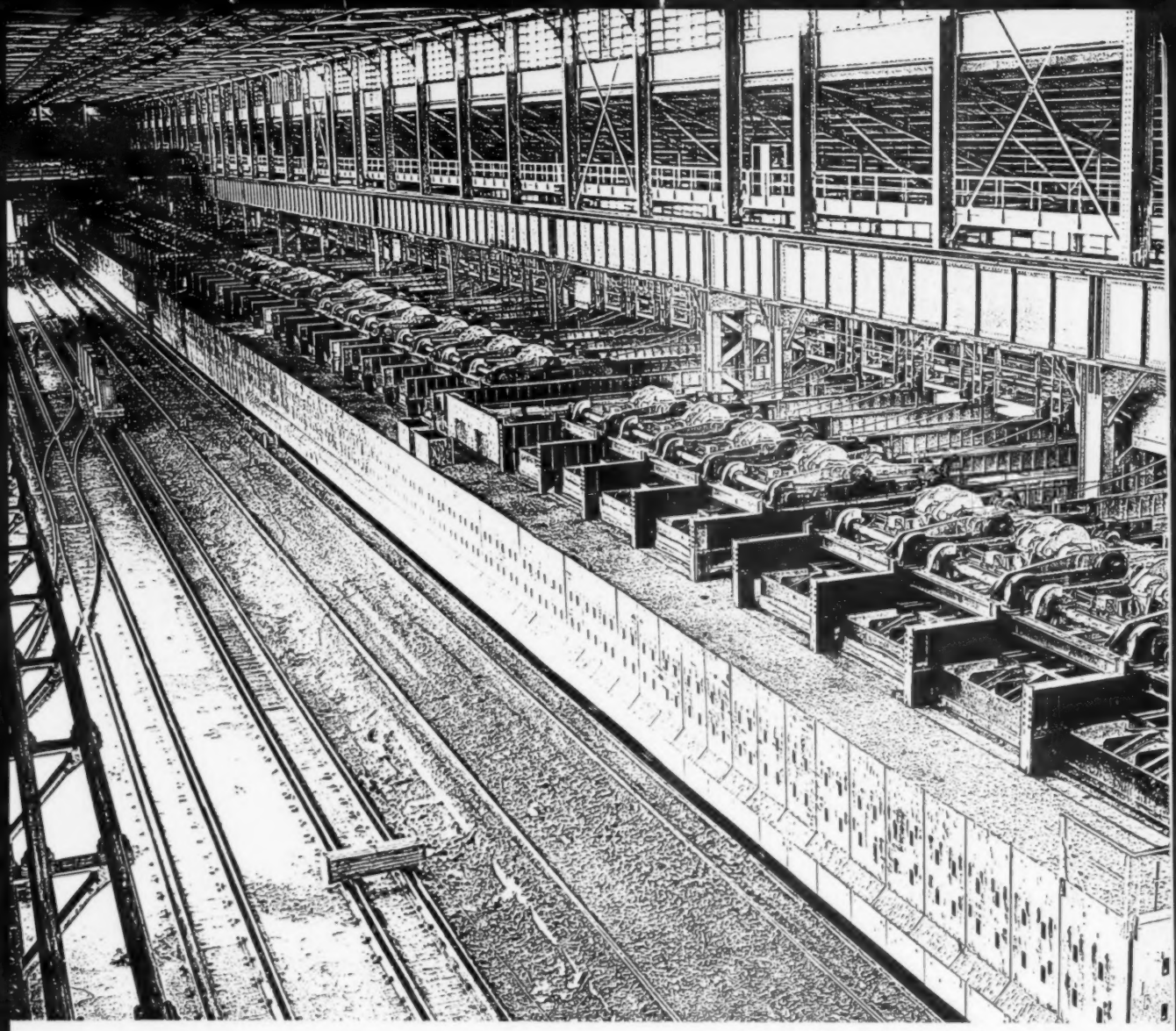
Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots... $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

(Effective June 5, 1961)



Courtesy of Gary Works, U.S. Steel Corporation

Gets them out the back door (750 tons/hr) This is the largest installation of soaking pits (48) ever built at one time. Engineered by Surface, it will heat an average of 750 tons per hour. At peak capacity, it loads the ingot buggies at a rate of 1200 tons per hour. A dual recuperator system applies the maximum amount of heat where it belongs—inside the pit. Address inquiries to 2402 Dorr St., Toledo 1, Ohio.

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SURFACE COMBUSTION, Toledo 1, Ohio/ a division of Midland-Ross Corporation MR

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500 TON/DAY BLAST FURNACE
108 KOPPERS COKE OVENS
2 PUSHER MACHINES

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800 Cu. Ft. Larry 14'8" Ga. 230V. DC (2)
65 Ton Hot Metal Std. Ga. w/65 Ton Ladles (4)
50 Ton Slag Std. Ga. w/300 Cu. Ft. Ladles (2)
50 Ton Slag Std. Ga. w/260 Cu. Ft. Ladles (2)
50 Ton Transfer Std. Ga. 230V. DC
10 Ton Quenching Std. Ga. 41'6" Wheelbase

OVERHEAD CRANES 230V. D.C.

110 Ton Cleveland Ladle 48'5" Span
20 Ton Shaw 41'7" Span, Cab Oper.
10 Ton Shaw 52' Span, Cab Oper.
10 Ton Bedford 3/4 Yd. Bucket 61' Span

ELECTRIC BRIDGE 230V. D.C.

Traveling on Rail, 230' Span, plus 80' Cantilever, 6 Ton Bucket, Single Trolley, Motor Driven

MISCELLANEOUS

Penna. HAMMERMILLS SX13 400 HP (3)
Koppers 2 Roll CRUSHER 36"x42" 40 HP
Trimmer CONVEYOR 30"x13'3" c/c Cleated
100 Ton PRINTOMATIC Larry Car SCALE, 14'8" c/c Rail
50 Ton 60' Platform Printomatic TRUCK SCALE
30 Ton 40' Platform Printomatic TRUCK SCALE
CAR HAULS Drum Type 20"x18", 25 HP
SKIP HOIST Lidgerwood 178'
MOTORS, DC Type CO & MD Series & Compound Wound 230V. 1 to 200 HP (100)
MOTORS AC 3/60/440V. Squirrel Cage & Slip Ring 1 to 100 HP (100)

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1—15-Ton Top Charge Electric Furnace. 4000 KVA Transformer, 13,800 volts

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CURRY & HUDSON ASSOCIATES, INC.

NO. 1 GATEWAY CENTER
PITTSBURGH 22, PENNSYLVANIA

Inquiries Pick Up In New York

Used machinery dealers in New York report activity is generally slower than in other parts of the country.

But overseas sales have given this market a lift. And inquiries are running high.

■ Used machinery sales in New York are generally trailing behind other parts of the country—especially the Midwest.

Says one New York dealer, "I've recently returned from a meeting of used machinery dealers in Washington. And there is no doubt that business here is much slower than in the Midwest."

But he adds, "I think our business is going to pick up within the next month or two."

Reason: While there isn't much live buying around New York, the rate of inquiries continues to hold up. Traditionally, a heavy rate of inquiries means buying is just around the corner.

Overseas Buying — Now foreign buying is starting to look like a factor in this market. Several dealers report selling heavy equipment such as forge presses and upsetters for shipment to Europe. One dealer says several European buyers have recently inspected much of his heavy machinery. He expects to close at least one large sale in the near future as the result of these inspections.

"Price isn't the factor in our European sales," reports one used tool man. "Fast delivery is the key. Used machinery is almost nonexistent on the overseas market. And new equipment takes as long as two years for delivery."

Red Sales?—There are also some reports that these European sales might be resulting in resales by the overseas dealers to buyers behind the Iron Curtain.

As far as the U. S. domestic market is concerned, used tool dealers say buyers should find it to their liking. There is plenty of good machinery available. And, though dealers have been keeping prices firm since the beginning of the year, there is a chance for bargaining.

New York toolmen also say financing is easier than ever to obtain now. A spot check of leading dealers shows that none lost any sales recently because of financing problems.

Auctions — But used machinery auctions are still disturbing to the dealers. Because auction prices are down, some buyers are bidding directly. The auction prices are down because many dealers are fully stocked.

"Give us a break, Fenton. Take a day off."

MUST VACATE PREMISES

Some as new as 1953
Immediate delivery — will sacrifice

BLUE PRINT MACHINE
BRUNING #20 "Copyflex" Blue Print Machine—42" wide, year 1958.
BORING MILLS—HORIZONTAL
GIDDINGS & LEWIS Model 45 Table Type. Dia. of spindle 5". Table 48" x 84".
SELLERS 5" Bar Floor Type. Dia. of spindle 5", floor plates 12' x 15', outboard support. New 1942.
CRANES
AMERICAN Eng. 4 ton, Indoor, 28' span, 10' lift, floor operated. AC Motors.
CONCO 15 ton Outdoor, 50' span, 20' lift, cab operated, DC motors.
CONCO 5 ton, Indoor, 50' span, 20' lift, cab operated, DC motors.
NILES 15 ton, Indoor, 50' span, 20' left, cab operated, DC motors.
NILES 5 ton, Indoor, 50' span, 20' lift, cab operated, DC motors.
P&H 10 ton, Indoor, 50' span, 20' lift, cab operated, DC motors.
DRILLS
CARLTON 4' arm 9" column Radial. #4 Morse Taper.
CARLTON 4' arm 11" column Radial. #5 Morse Taper.
CARLTON 4' arm 13" column Radial. #5 Morse Taper.
CARLTON 5' arm 15" column Radial. #5 Morse Taper.
CINCINNATI BICKFORD 24" Box column; new 1957.
DRAW BENCHES HORIZ.
BALDWIN SOUTHWARK #76-40, 76" stroke, 40 ton capacity. New 1950.
LAKE ERIE 75 ton, 84" stroke. New 1950.
FURNACES
HAYES Model HG-80 Electric Heat Treat. Size 28" x 18" x 60" with controls.
HAYES Model LR-90 Electric Heat Treat. Size 34" x 18" x 72" with controls.
GEAR MACHINERY
GLEASON #16 Spiral Bevel, Hypoid and Zerol; "Jobbing Machines," with modified roll; complete equipment, year 1953. Nearly unused.
GLEASON #17 Bevel Gear Grinding.
GOULD & EBERHARDT #48H Universal Gear Hobbing for helical, spur and worm gears. POWER INFEED. New 1943.
GRINDERS
BROWN & SHARPE #3 Universal Grinding Machine.
HAMMOND Model 14-SW Double Carbide Tool Grinder, wheel dia. 14". New 1953.
NORTON #2 Universal Cutter and Tool Grinder.
HAMMERS
CHAMBERSBURG 3000# CECO Drop Hammer. New 1952.
LATHES
HENDEY 12" x 54" Centers Geared Head Toolroom with 4-jaw independent chuck, 3-jaw Universal chuck. TAPER ATTACHMENT. New 1946.
HENDEY 16" x 54" Centers Geared Head Toolroom, 4-jaw chuck, 3-jaw Universal chuck. Taper attachment. New 1946.
MONARCH 27" x 156" Centers. Flame hardened ways, TAPER ATTACHMENT, rapid traverse, 4-jaw chuck.
MONARCH 27" x 300" Centers Model N. 2 carriages with rapid traverse.
NEBEL 18" x 54" Centers. 4-jaw chuck, 3-jaw Universal chuck, taper attachment. New 1952.
NILES 48" x 35' Centers Heavy Duty with 2 carriages rapid traverse. New 1943.
MILLERS
CINCINNATI O-8 Vertical. Size of table 24¾" x 9".
KEARNEY & TRECKER (MILWAUKEE) Model 4K Plain Horizontal table 60" x 16". High speed.
KEARNEY & TRECKER (MILWAUKEE) #5H Plain Horizontal; table size 18" x 94". High speed.
KEARNEY & TRECKER (MILWAUKEE) #5HM Horizontal; table 18" x 94".
TURRET LATHES
WARNER & SWASEY #2A Universal. Saddle type, PRESELECTOR HEAD; swing 21½", CHUCKER.
WARNER & SWASEY 4A Universal. Saddle type, Rapid Traverse for chucking; spindle 8".
PLANERS
GRAY 72" x 72" x 20' Heavy Duty Openside Planer. Table 85" wide x 242" long, box type; 2 SWIVEL RAIL HEADS, 1 SWIVEL RIGHT HAND SIDE HEAD, rapid traverse, clapper box lifters, power clamping. VARI-VOLTAGE generator.
PRESSES
BIRDSBORO 800 ton Straightening — Hydraulic; stroke 19" table 21½" W x 192" L.
BLISS #60¼, 1200 tons Straight Side; stroke 24"; bed area 51" x 60"; air clutch, air cushion.
BLISS #79½ Single Crank Straight Side; capacity 500 tons; 14" stroke; Bed area 41½" x 42" with air cushion. Electro-magnetic clutch.
CLEVELAND 300 ton straight side double crank, bed area 24" x 72", stroke 3", air clutch, new 1946.
HPM Model CU-2 Hydraulic Press; capacity 400 tons; stroke 36"; Bed area 48" x 48"; self-contained hydraulic unit. New 1949.
HAMILTON #4013½ Straight Side Single Crank; capacity 500 tons; stroke 18", Bed area 41" x 42"; air clutch, air cushion.
HAMILTON #4019 Straight Side; capacity 1000 tons; stroke 24", bed area 41" x 54"; air clutch, air cushion.
HAMILTON #4116½ Straight Side Single Crank; capacity 850 tons; stroke 24"; bed area 42" x 54"; equipped with air clutch, air cushion.
LAKE ERIE 235 ton Four Post Hydraulic; bed area 46" x 46"; stroke 12"; new 1952.
TOLEDO #96C Straight Side Double Crank; capacity 405 tons; stroke 12"; bed area 70½" x 51"; with air clutch, air cushion.
SHEARS
CLEVELAND ¾" x 72" Plate Shear and Gang Punch; Model 80-EG-84; 300 ton capacity; new 1946.
NIAGARA ¾" x 120" Capacity Gap Type Power Shear — Model KL 10. New 1941.
SCREW MACHINE AUTOMATIC
CONOMATIC 1⅝" 8 Spindle High Speed. New 1944.
TRANSFORMERS
3—ALLIS CHALMERS 2000 KVA Transformers; 13800 taps, volts KWDG 2400 with controls.
3—MALONEY 333 KVA ASKAREL Type ASPL Transformers. H.V. 2480/4160 with controls.
3—WESTINGHOUSE 75 KVA Type AVR Hypersic Transformers. Voltage 2400 to 480/220; controls.
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HP	RPM	MAKE	VOLTS	TYPE
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1250	3600	Al.-Ch.	4000	DP/FF
800	600	West.	2300	CS-44
600	600	West.	2300	CS-13
500	1800	G.E.	2300	KT-5457
500	1200	G.E.	2300	FT-567
350	3600	Cr.-Wh.	440	SC-66
350	1200	West.	440	CS-22544H
200	900	West.	440	CS-8748
200	720	G.E.	440	KF-5445

SLIP RING MOTORS

3 ph. 60 cy. 220 or 440 volts

HP	RPM	MAKE	VOLTS	TYPE
1500	514	Al.-Ch.	2300	Mill
1000	1200	Al.-Ch.	4000	Any
1000	900	Al.-Ch.	2300	Any
600	1800	G.E.	4160	M-6345-8
500	1200	G.E.	440	M-6345-Z
500	900	G.E.	440	IM
350	1800	Al.-Ch.	2300	ART
250	720	G.E.	4000	IM
200	720	G.E.	2300	MT-546

MOTOR GENERATOR SETS

KW	MAKE	MOTOR A.C.V.	GENERATOR D.C.V.
1750	G.E.	4160/2300	250/300
1000	West.	4160/2300	250
750	G.E.	4160/2300	250
600	G.E. (3 unit)	2300/440	125/250
500	G.E.	2300	250
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250	G.E.	2300	250

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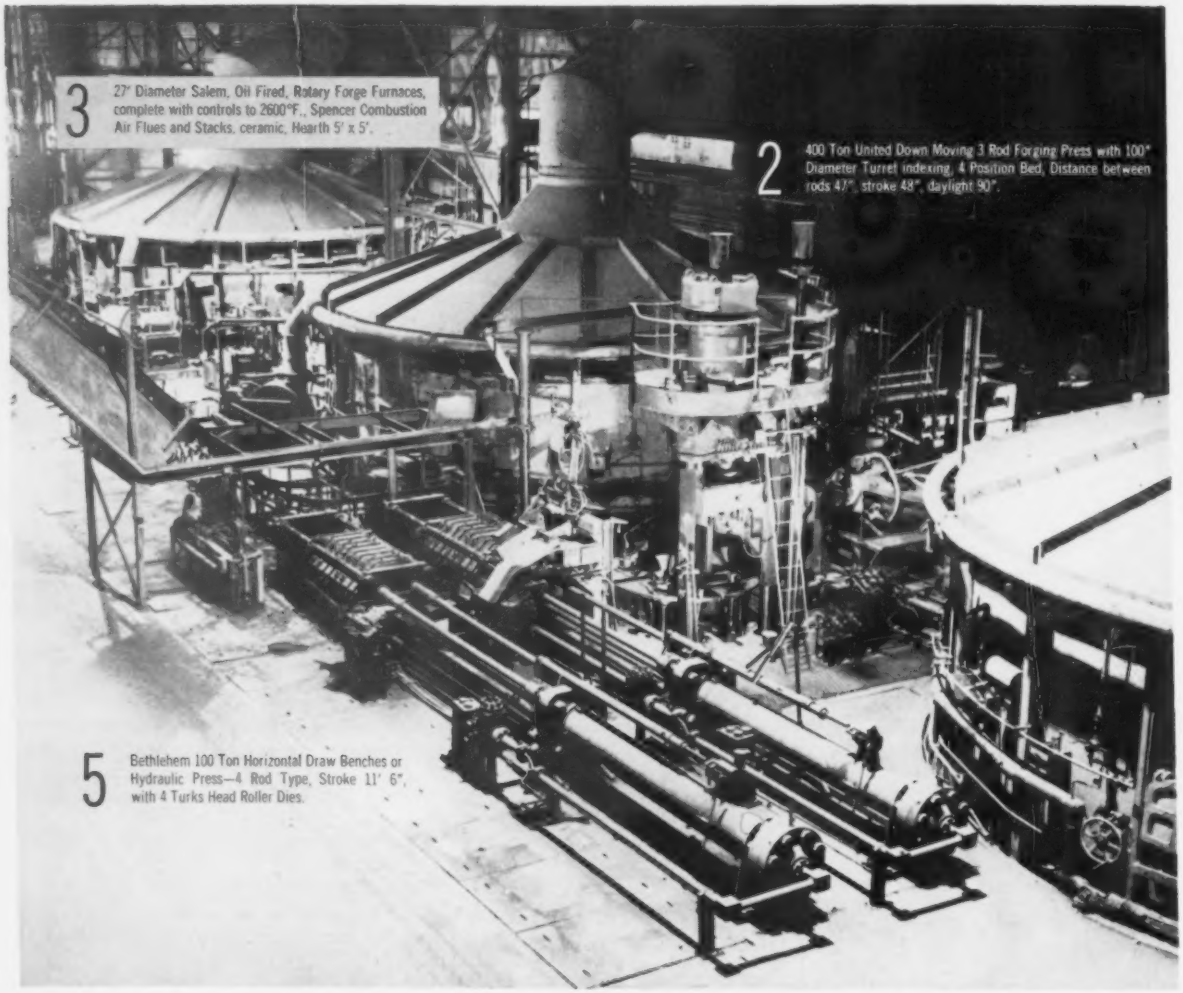
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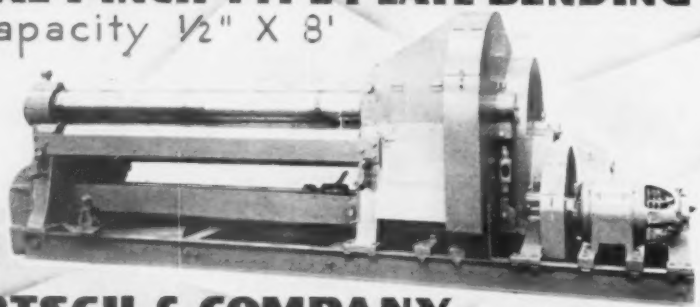

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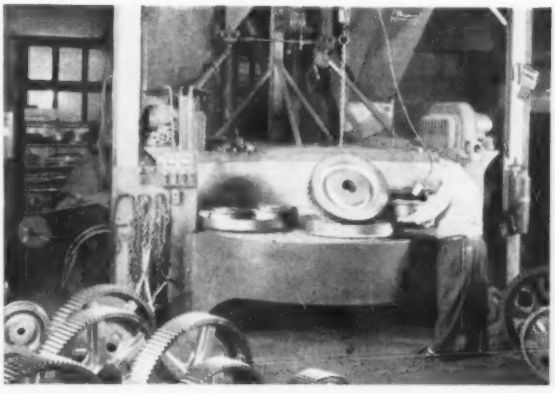
No two ways about it: Rotoblast equipment cuts cleaning costs, sometimes by as much as 70%. Hundreds of manufacturers have improved their profit picture — as well as their quality of cleaning — with Rotoblast because it reduces manpower—up to 75% . . . works faster, up to 50% faster for straight through processing ...requires much less maintenance... reduces down-time.

Whether it is a small Rotoblast barrel or a giant tableroom, you'll find that the day you start using Rotoblast is the day your cleaning costs start to come down. And you'll get additional cleaning economies with the use of solid, tough, Rotoblast Steel Shot and Grit. To get the full story, write:



Pangborn

OF HAGERSTOWN

PANGBORN CORPORATION, 1500 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada Ltd., 47 Shaft Rd., Toronto (Rexdale), Canada;—Manufacturers of Blast Cleaning, Vibratory Finishing, Dust Control Equipment—Rotoblast® Steel Shot and Grit®.

Missile launcher goes anywhere on Timken® tapered roller bearings

You can't see the Thor missile transporter-erector in the picture above—it's covered, "loaded" and ready to be flown to its destination. There it will be speeded to its launching site over straightaways or narrow, winding roads. To take sharp road curves the transporter has steerable rear axles—the first of their kind. And to assure easy steering, reliable rolling and dependable performance, its builder—Food Machinery and Chemical Corp.—specified Timken® tapered roller bearings for inner and outer wheels and steering pivot.

Because Timken bearings roll true, have quality through and through, they practically eliminate friction. Wheels start and roll more easily. Their tapered design lets Timken bearings take any combination of loads—up, down and sideways. And the positive clearance setting establishes uniform, correct geometry in the bearing, gives rigid, accurate wheel support. Timken bearings have come a long way since 1895 when they helped mules pull a St. Louis wagon—today, they're speeding missiles to launching sites.

ENGINEERING SERVICE from our graduate engineer salesmen can often solve your bearing problems on the spot. And they'll help you select the right bearing for your application from the wide range of Timken bearing types and sizes.

Industry rolls on

TIMKEN®

tapered roller bearings

The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Div.: Canadian Timken, St. Thomas, Ont.